MEDICAL GYMNASTICS

POSSE

MEDICAL GYMNASTICS.

A SERIES OF ARTICLES

BY

THE BARON NILS POSSE, K. G. V.

(Reprint from the Posse Gymnasium Journal.)

MEDICAL GYMNASTICS

PART 1.

MATERIA GYMNASTICA.

Definition. — *Medical Gymnastics* means systematic exercise of the muscles and other tissues for therapeutic purposes While no distinct line can be drawn between Hygienic and Medical gymnastics, it will however be found that a majority of the medico-gymnastic procedures differ from ordinary gymnastics even though these are used as auxiliaries in special cases. In these chapters but few movements of the last-named kind will be described, as a masseur of to-day is expected to be well versed in the theory of educational gymnastics before he attempts the medical branch of the science.

Medical Gymnastics has been commonly known as "Swedish Movement Cure," "Movement treatment," etc., and whereas some authors cannot lay enough stress on the distinction between medical gymnastics and massage, others have included under the last name all forms of manual therapeutics. Massage, however, is usually understood as denoting one of the procedures of friction, kneading, pressure and percussion, each one of which may be regarded as passive exercise of the muscles. It will then be the most convenient to include massage in

the name "medical gymnastics," all the more since a skilled masseur never relies exclusively on massage proper, nor a medical gymnast on "Swedish movements."

Since times immemorial exercise of one kind or another has been used for curative purposes; yet we owe it to the Swede Pehr Henrik Ling and to his pupils and followers that science was brought to bear on the subject; and while scientific therapo-gymnastics may have been said to originate in Sweden, medical gymnastics to-day has ceased to be merely a "Swedish Movement Cure."

While Dr. Metzger of Amsterdam has revived the interest in massage in continental Europe, neither he nor Ling invented this form of treatment. Dr. Metzger* applies what Ling** described before Metzger was born; and Ling gathered his information from still remoter sources, not least from Chinese manuscripts handed down to the present generation since 3000 years B. C.

The claim made† for Dr. Weir Mitchell to be "the father of modern massage" is invalid, for the rubbing used in his rest-cure has very little in common with massage, if we are to judge by the operators claiming to have been taught by him.

The procedures of massage as described in these chapters are not according to the Metzger or "wet school," but are nearly identical with those described by Dr.

*Born 1840.

**Died 1839.

†By Dr. Tibbits, of London, Eng.

Douglas Graham, and practised by the foremost masseurs of Europe, such as the late Prof. Cederschiold, Ulrich, etc.

Before entering into the consideration of details, it may be well to state a few facts pertaining to movements in general.

Position and Movement.—A movement is a change from one position to another, and might be said to consist of a sequence of positions. In order to accomplish a definite, preconceived purpose, commencing position, final position, sphere of action, velocity, force, duration, etc., must be exact.

Effects of Movements.—"The effect of a movement is the result of its action, and the reaction of our organism" (Roth). The effct may be physical, physiological and psychological, and movements also have both a general and a local effect. While the local effect usually decides the choice of a movement, its general effects should never be left entirely out of consideration. Also medical gymnastics may be applied as local or as constitutional treatment in accordance with these effects.

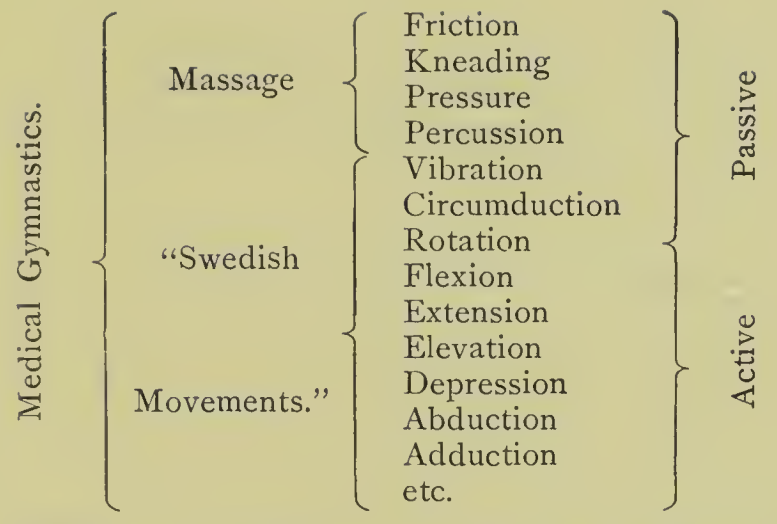
The general effects of active movements are those of ordinary gymnastics, *i. e.*, a general increase of the functional activity; resistive movements emphasize these effects, while assistive movements produce them in a less degree. Active movements involve the use of attention, and consequently cultivate voluntary control, while passive movements diminish motor irritability and voluntary

co-ordination, and favor inattention or inactivity of attention. Active movements diminish sensory, and heighten motor irritability, harden the fibrous tissues,and lessen the adipose ones; passive movements may increase sensory and lessen motor irritability, make lamellous texture predominant and cause a greater amount of fat to accumulate between the muscles and under the skin.

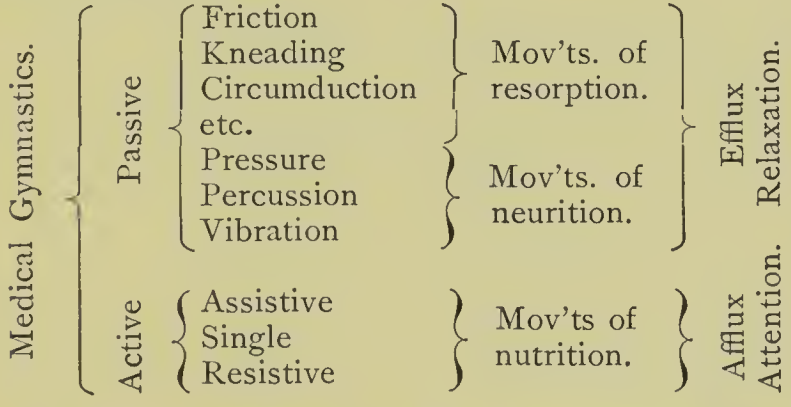
The local effects of movements will be described with each procedure.

Positions.—Although massage proper is usually applied while the operator is reclining or lying down, for other procedures commencing positions of the most diverse kinds are used for exactness of effect—for its localization or generalization. Commencing positions are elementary and derived. Elementary are lying, sitting, kneeling, standing and hanging; all others are derived from these.

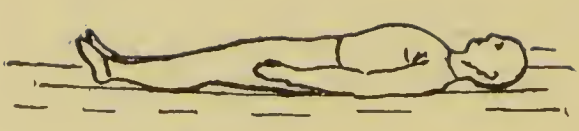
Classification of Movements.—Medico-gymnastic movements are *active* when executed by the patient himself; if the operator makes resistance against the movement it becomes *resistive*; if he helps the patient in performing it, it becomes *assistive*; if he is doing the movement without any voluntary effort whatsoever from the patient, the movement is called *passive*, while the movement executed by the patient without aid or resistance from the operator is called *single*. Besides these general names, each procedure has one denoting its mechanics, so that a synopsis of the subject would present the following appearance: —



While this classification will be of assistance in describing the movements, yet for therapeutic purposes a classification according to effects will be more rational and after the masseur has acquired the mechanics of the various procedures, he will be best helped by memorizing the following synopsis:

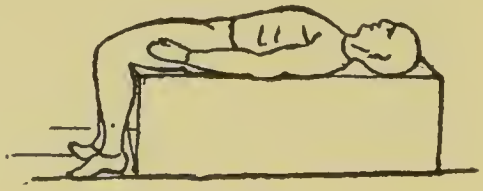


The rationale of this will be plain after the various movements have been described.



1

Lying pos. (fig. 1) — The patient is lying on his back, his arms along his sides; knees straight; heels together; and the body supported along its entire length. Characteristics of this position are the total relaxation of all voluntary muscles and the consequent diminution of cerebration. As compared to the standing pos., respiration is now more labored; for the inspiratory muscles especially the diaphragm, are directly opposing gravity in their effect upon the abdominal organs: the sagittal expansion of the abdomen diminishes while the lateral one increases. Viscera gravitate toward the posterior side of the body, and the total circulation increases in this direction, even to causing spinal congestion.



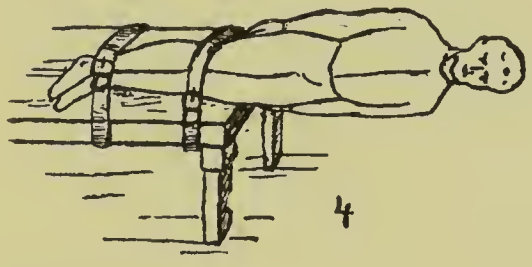
2

Sit-lying (Fig.2) — Lying with the legs hanging unsupported. Fascia Lata has now become somewhat tense, and the inferior attachments of the abdominal muscles

are slightly drawn down. The inspiratory condensation wave in the abdomen becomes shallower; and the pelvic contents are pressed toward the sacrum.

3

Leg-lying (Fig.3) — The body is supported only from feet to waist. The muscles of the abdomen and thigh are now tense; viscera are forced backward; and the blood is driven into chest and head, especially toward the medulla. At first there is an increase of attention which is soon followed by dizziness.



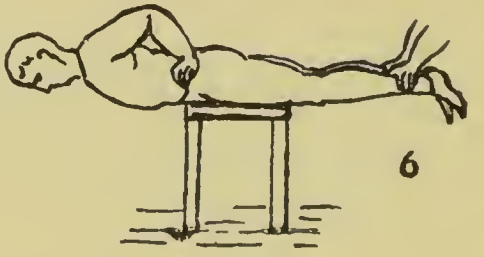
4

Side-lying. — The body is resting on the side.

Side-leg-lying. (Fig.4)— A combination of the last two. Here gravity assisted by the carrying muscles causes the spine to curve to the under side, which becomes expanded.

5

Prone-lying, (Fig.5) — The body is lying face down. It is usually taken so that the plantar side of the toes braces the body behind; and the elbows, vertically under the shoulders, with hands grasping opposite arms, support the body in front. In this situation, viscera gravitate forward; the chest is expanded; and internal elevation results. Gravity draws the blood into the anterior portion of the body, away from the spine and cerebellum. The position is one of "meditation."



6

Forward lying(Fig.6)—The body, turned face down, is supported from the waist down. The glutei and extensors of the back are in contraction; the dorsal spine straightens and the chest becomes vaulted. The position heightens respiration and cerebration. The farther the support

is from the head, the lower in the back will be found the strongest muscular contraction; so that, if the upper dorsal region is to be affected, the support is placed under the thorax.

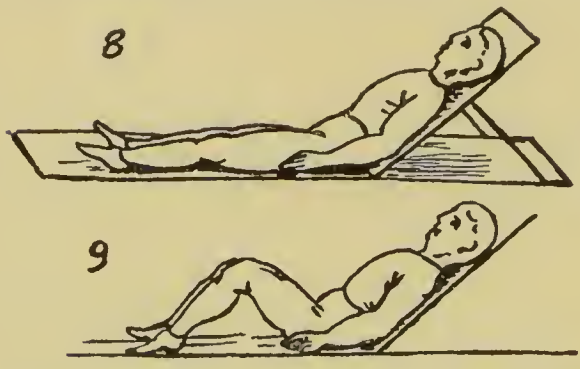
7

Crook-lying — (Fig.7) — The knees are drawn up and feet supported (vertically under the knees). The muscles of the abdomen are now relaxed and viscera fall backward-upward. The tension in the lumbar fascia through the glutei causes the lumbar curvature to straighten. The position favors thoracic aspiration.

Reclining (fig. 8)—The body is resting on a couch so that the trunk is inclined backward. Respiration is easier than in ly. pos. This position is specially suited for massage or other movements where a saving of energy is desired. The more the body inclines, the less is the relaxation of the abdomen. The posture is one of ease and comfort, although less passive than the ly. pos.

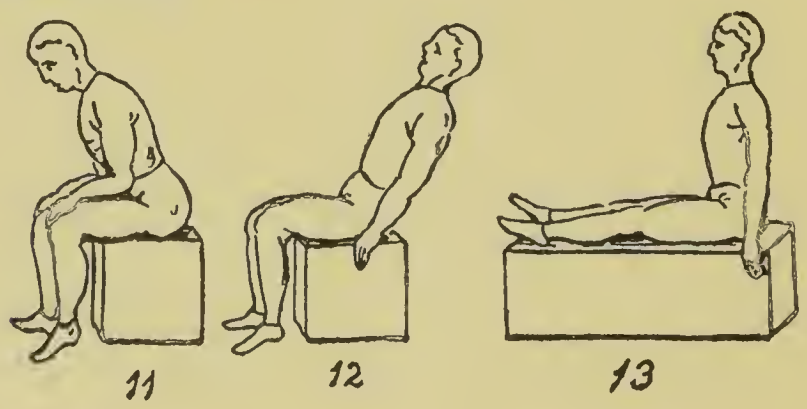
Crook reclining (fig. 9)—Reclining with knees drawn up as in cr. ly. The abdomen is completely relaxed; viscera spread laterally and fall toward the sacrum. The

blood also gravitates toward this region. The position is especially suitable for massage of the abdomen and for active movements of other parts where the abdomen is to be excluded from the effect.



Sitting position (*fig* 10)—Ordinary sitting posture with erect trunk and head, hips and knees flexed at right angles, heels together and toes turned out, hands resting on the knees. Viscera become slightly compressed.

The posture is one of physical rest with mental activity, and produces isolation of the trunk from the legs. The short line of gravity makes this position less tiresome than standing.



Stoop sitt. (*fig.* 11)—Sitting, with the trunk inclined forward. The abdomen is now completely relaxed, and viscera compressed forw., while the back muscles are in contraction vaulting the chest. In this position attention is more active than in the previous one.

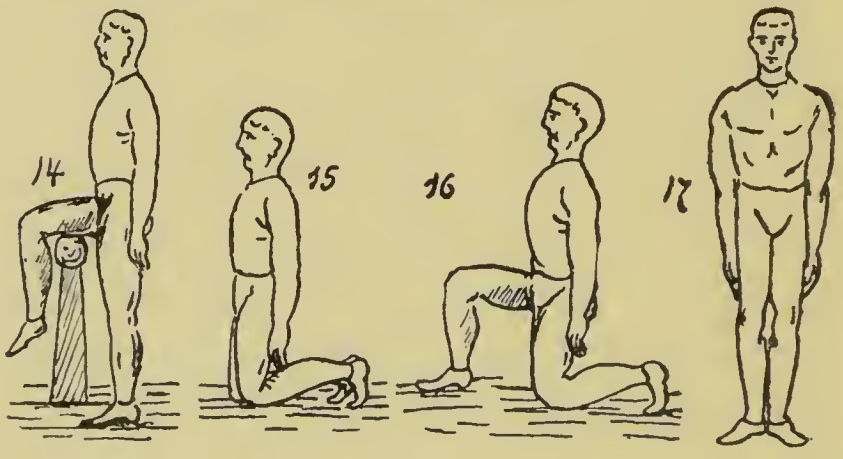
Fall sitt. (*fig.* 12)—Sitting with the trunk inclined backward. The feet should be inserted in some firm support, or an assistant gives support on the knees. The muscles of the abdomen are in contraction compressing viscera from above downward, driving the blood into the pelvis, and into the chest. The lumbar spine straightens.

Turn sitt.—Sitting with the body rotated to one side. This produces a unilateral expansion of the chest, and an oblique compression of the abdomen. The elongation of the thorax occurs towards the everted shoulder, and there is an elevation of viscera in this direction. The position is used chiefly in the treatment of scoliosis.

Long sitting (*fig.* 13)—Sitting with the legs put up. The relaxation of the fascia lata causes the lower insertions of the abdominal muscles to rise, with a consequent relaxation of the abdomen. The tension in the glutei is communicated into the hamstrings, so that the whole posterior leg is in passive extension. This determines a greater flow of blood through the legs, with a greater diminution of the supply to the spine. Mental activity is less than in sitt. pos.

Ride sitting—Sitting astride a chair, usually with the feet fixed. This produces absolute isolation of the hip joint so that trunk movements will be confined to the spine.

Half sitting (fig. 14)—Standing with one thigh resting over a support, the leg of that side hanging.—Is to be considered as a unilateral standing pos.



Kneeling, or knee-standing (fig. 15)—Standing on the knees; body erect; knees one foot length apart; heels together; toes turned out and resting with the plantar surface on the ground. The pelvis is compressed through the tension in fascia lata. The hip is fixed laterally through the tensor vaginæ femoris, and movements of the trunk are communicated into the pelvis instead of into the thigh, as in st. pos. The position is suitable in movements for pelvic disorders, but is fatiguing if long continued.

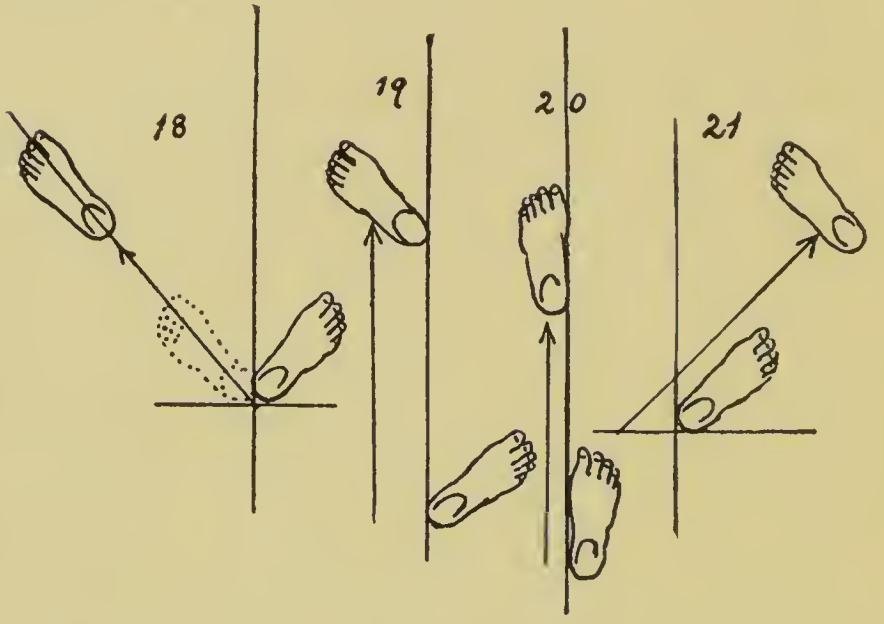
Half knee-standing (*fig.* 16)—1-2 kn. st.—Kneeling on one knee, the other foot on the floor in front, with the knee of that side bent so that the leg is vertical; the body erect from the backward knee. The tension in the muscles of the kneeling side causes fixation of linea alba, so that sagittal movements will be executed chiefly with the muscles of the opposite side, while the effect of internal elevation will be the strongest on the first named side. The position is suitable for unilateral effects upon the pelvis and groin.

Standing (*fig.* 17)—St.—Feet at right angles; heels together; knees straight; hips drawn backward; chest well elevated and brought forward; head high with chin drawn in; arms hanging along the sides. This position, characteristic of man, is expressive of concentrated energy, and is fundamental to all human locomotion. Yet, on account of the lack of isolation in this position, and because of its being tiresome, it is used but little in medical gymnastics, except for "single" movements. In this position respiration occurs more easily than in any other.

Close st.—The feet are turned straight forward. Equilibrium is less stable, and the abdomen is more relaxed than in st. pos.

Toe st.—The heels are raised from the ground. The dorsal spine is straighter, the chest more expanded and the abdomen more flattened than in st. pos.

Walk st.—One foot in advance of the other; the distance between the heels, two foot lengths; both knees straight; weight equally on both feet.

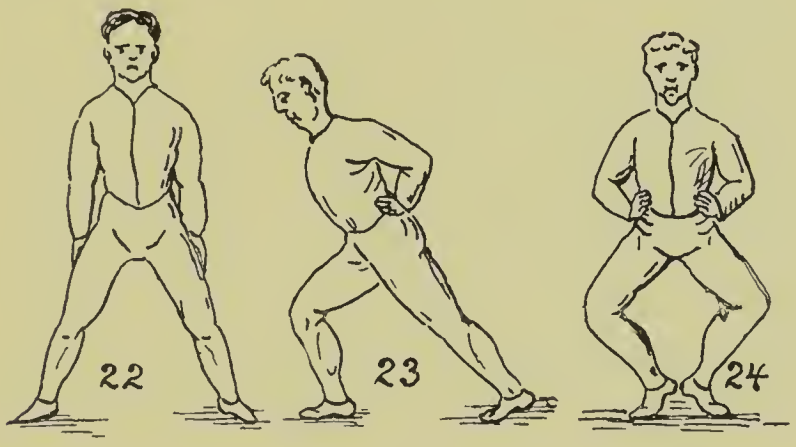


Wlk. *a* st. —fig. 18; wlk *b* st.—fig. 19; wlk. *c* st.—fig. 20; wlk. *d* st.—fig. 21.

Stride st.—(fig. 22)—Feet twice their own length apart; a line through the heels parallel with one through the shoulders. Both knees straight and weight equally on both feet. In this position equilibrium is better laterally, poorer sagittally, than in st. pos., through the corresponding fixation and relaxation of the hip joint.

The wlk. st. positions are used for muscular isolation, so that for instance trunk rotations are made more diffi-

cult and localized higher in the thorax by progressing from stride st. to wlk. *a*, wlk. *b*, wlk. *c*, and wlk *d*, st. pos., in the order enumerated, the rotations of the thigh becoming excluded from the movement. In wlk. *b* pos. backward movements produce a stronger tension in the posterior leg, and forward movements in the anterior one. The hip of the advanced leg is raised and the pelvis rotates to the opposite side. Whenever unilateral effects are desired, as in scoliosis, these positions are very useful.



Fallout st.—(fig. 23)—One foot three times its own length in advance of the other; feet turned out and fully on the ground; forward knee bent; backward knee straight, and this leg in a line with the body which inclines forward. The erectors of the spine are in stronger contraction than in st. pos., especially those of the side

corresponding to the backward leg. There is a diminution of capacity in the side of the thorax which corresponds to the advanced leg, the hip of this side rising, and there is an increase of capacity on the opposite side accompanied by a flattening of the abdomen. The blood is drawn from abdomen and pelvis into chest and legs. The position is very tiresome.

If the backward foot is inserted into some firm apparatus, the position is called foot grasp falloutst., which possesses all the qualities of the preceding one in exaggeration.

Courtesy st. (fig. 24)—From toe st. the knees are bent to right angles. The knees are turned out in direction of the feet; the heels are held together. The activity of the muscles of the legs determines a greater afflux in this direction. The chest is expanded more than in st. pos., and the abdomen compressed. The total result is a diminution of blood supply in the abdomen and pelvis. Internal organs of these cavities are forced backward. The position demands a great deal of co-ordination, and hence intensifies cerebellar activity and voluntary attention.

This position is also taken from stride st. pos. and from wlk. *b* st.

Courtesy sitting (fig. 25)—The knees are bent as far as possible. The effects are similar to those of the preced-

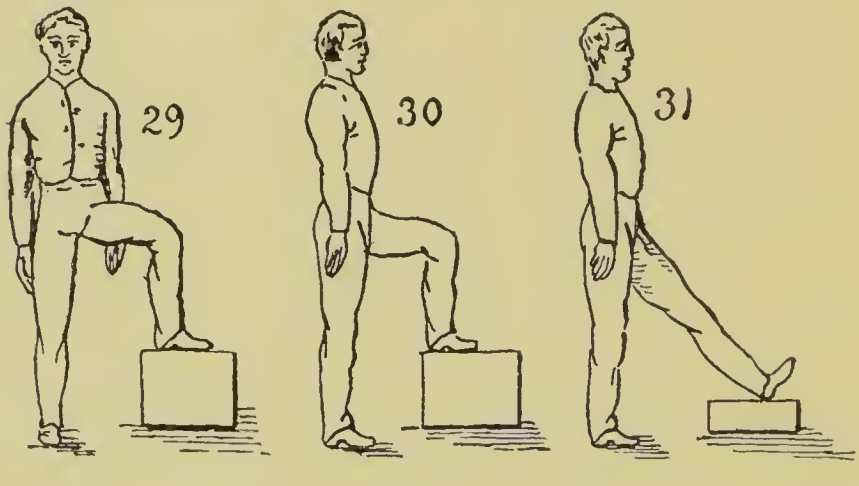
ing position, although highly increased. The effect upon he brain is diminished, as this position requires less effort of equilibrium.

Half standing—1-2 st. (fig. 26)—Standing on one foot, the other raised backward. The contraction of the extensors of the back are strongest on the side of the lifted leg, so that the spine curves to the opposite side. The chest is the most expanded on the side of the carrying leg, and the trunk is slightly rotated to that side. Unilateral cerebration.

Crook a 1-2 *st.* (*Cr. a* 1-2 *st.*) (fig. 27)—Standing on one foot, the other leg lifted forward with hip and knee bent at right angles. Effects like preceding, added to which pelvic viscera on the side of the lifted leg become compressed from behind forward.

Cr. b 1-2 *st.* (fig. 28)—Standing on one foot, the other leg lifted forward with straight knee. Effects similar to

the preceding, but the anterior wall of the abdomen is also brought into contraction, producing internal elevation of pelvic viscera of that side. The posterior leg is in passive extension and consequently the quantity of blood in that leg increases.



Step. st. (fig. 30).—Standing on one foot, the other placed forward on a chair or other support, knee and hips at right angles.—The hip of the advanced foot is raised without disturbance of the dorsal spine, and the abdomen is relaxed on that side.

Side step st. (fig. 29).=preceding, but the foot is placed sideways instead of forward.—The principal change of effect is in the abdomen, which here is tense toward the lifted leg.

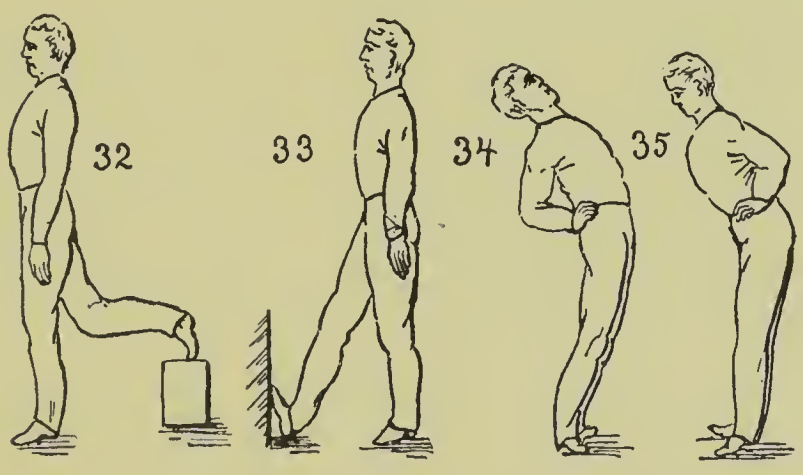
Heel grasp 1-2 *st.* (fig. 31).—One foot is placed forward with the heel resting on some support; knee

straight.—The passive extension of the hamstrings of the lifted leg causes a greater quantity of blood to flow into that leg, lessening the supply to the lumbar spine.

Instep gr. 1-2 *st.* (fig. 32)—One foot is placed backward upon some support, the knee flexed.—The passive extension of the anterior thigh draws the blood from the abdomen.

Brace st. (fig. 33.)—One foot is braced forward against the wall.—Produces passive extension of the forward calf.

Besides the above positions the trunk may assume any of the following:



Arch pos. (fig. 34.)—Body arched backward from sacrum to head.—The intervertebral substances are compressed behind, distended in front. The chest is arched forward, the inferior ribs drawn apart, abdomen flattened

and viscera drawn upward. Inhalation increases and mental activity decreases.

Fall pos. (fig 12.)—Body inclined backward without being arched.—There is no change in the chest worth mentioning, but the muscles of the abdomen are in strong contraction, driving viscera upward and diminishing the quantity of blood in the abdomen. The sagittal curve of the lumbar spine straightens.

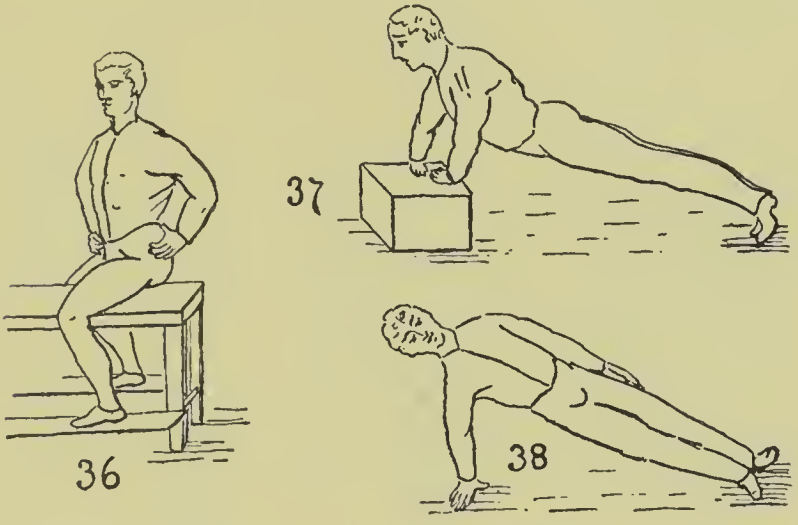
Stoop pos. (fig. 35.)—The body inclines forward with arched spine; chest well expanded.—The abdomen is compressed from above downward forward; the extensors of the spine are in strong contraction, (less so than in forw. ly. and falloutst. pos.) drawing the shoulder blades backward, downward. Respiration and mental activity are increased. The posterior leg-muscles are contracting excentrically, (compare "active movements" below) causing a greater afflux to this region.

Lax. pos.—The body is bent forward and completely relaxed.—Respiration diminishes, the chest being compressed. The abdomen is completely relaxed, with contents falling forward, downward. The blood gravitates from the thorax into the head and abdomen.

Turn pos. (fig. 36.)—The body is rotated to one side —The oblique muscles of the abdomen contracting, viscera become lifted toward the chest, the latter having expanded toward the side to which rotation occurred.

The spinal vessels become stretched, the afflux increasing, and the spine shows a tendency to convexity toward the side to which the vertebræ have been turned. Respiration is greater in the lung of that side than in the other one.

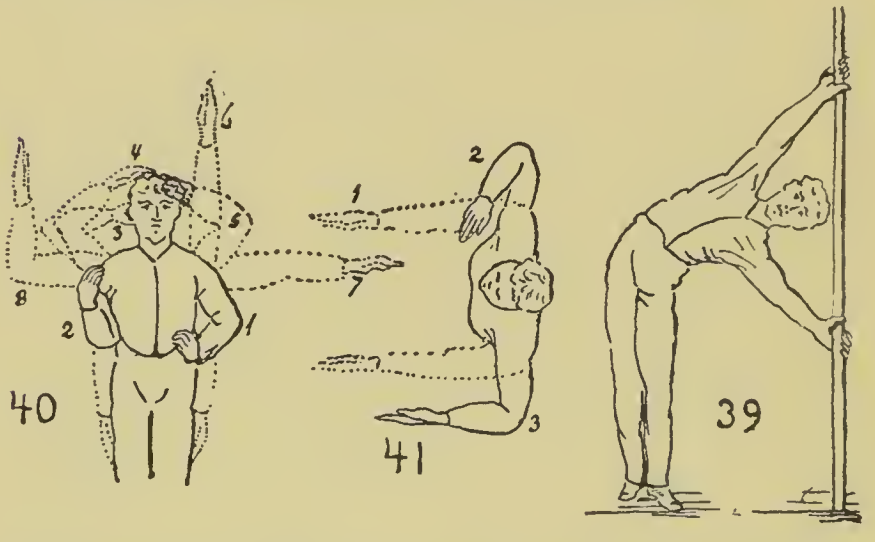
If one foot is in advance of the other and the body is rotated toward the backward foot, the position is called reverse turn (rev. turn).



Stoop falling pos. (fig. 37.)—Hands and feet on the floor, the body from head to heels forming a straight line. The hands are turned obliquely inward, and the toes are braced against the floor. This position has the same effects as prone ly. pos., (fig. 5), but requires more muscular strength for execution. The chest widens be-

tween the shoulders, and the effect of internal elevation is emphasized. The higher the hands are placed above the floor, the greater the effect upon the chest, the less on the abdomen.

Side falling pos. (fig. 38.)—One hand and one foot on the floor, the body in a straight line from head to heels. —The waist muscles of the under side are in strong contraction; the level of the hips deviates to the opposite side. Internal organs gravitate to the under side.



Side grasp, etc. (fig. 39.)—The arms are extended upward, the body bent to the side and the hands grasping a firm support.—The hip-level deviates to the upper side; the lumbar spine is arched to that side and the thorax is forcibly expanded with the upper side in passive extension.

Finally the arms can assume the following positions:

Wing pos.—(wg., fig. 40. 1.)—Hands grasp the waist in the middle, fingers in front, thumbs behind, palms resting on the hips. The elbows are drawn slightly backward.—The hips carry the shoulders through the oblique beams formed by the arms. The inspiratory muscles are given one more fixed insertion (on the arm), the chest is raised and respiration deeper. In movements of the trunk the body below the waist is more easily isolated, and in movements of the legs the trunk can be kept steadier.

Bend pos. (fig. 40. 2.)—The elbows are bent as far as possible; wrists and fingers bent; hands in front of the shoulders; arms vertical; elbows close to the waist.—The extensors of the elbow are in passive extension. There is a slight transverse tension in the clavicular region.

Rest pos. (fig. 40. 3.)—Hands locked behind the neck; elbows drawn well back; head high.—The whole chest is elevated, the pectoral portion fixed. The dorsal spine is straightened, and the shoulder-blades flattened on the back and rotated outward. The relation of the axillary artery favors the afflux to the arm with consequent diminution of supply to the head. The centre of gravity of the body is raised.

Shelter pos. (fig. 40. 4.)—The hands are locked on the top of the head.—The pectoral region is less tense than

in rest pos. The position is used to one side in scoliosis to draw the head to that side.

Think pos. (fig. 40. 5.)—The hands resting on the forehead, elbows back.—Is used only in sitt. res. exc. T. forward flex., to prevent the chest from contracting.

Reach pos. (fig. 41. 1.)—Arms lifted forward to horizontal, palms turned toward each other.

Stretch pos. (Str., fig. 40. 6.)—Arms extended upward to vertical; hands shoulder width apart, and palms turned toward each other.—The chest widens laterally and rises vertically with a slight transverse compression of the clavicular region. The abdomen flattens through passive extension of its muscles. The back widens, the shoulder-blades become fixed and the dorsal spine straightens. The total capacity of the chest has increased, but the tidal volume of air diminishes. The position is one of strong internal elevation with increased afflux in thorax and arms.

Hanging pos. (Hang.)=Str. pos., but the body is suspended from the hands grasping a firm support. All the muscles, with exception of those of the forearm, are in passive extension. The effect of internal elevation is emphasized: the chest is forcibly expanded in all directions, and the abdomen extremely tense. The weight of the legs acting through the sacrum stretches the spine, drawing its segments apart, and accelerating the return

current from the cord. (The old-time theory that the weight of the legs dragging the abdomen down should cause downward displacement of pelvic viscera is fallacious; for the abdomen does not carry the legs, and the tension in the abdomen is upward, toward the expanded chest.) The position is one of labored respiration, but tends to remove nervous fatigue.

When the palms face the body, the position is called under grasp hang., when the opposite way, over grasp hang.; and when the palms face each other, it is called double gr. hang.

In und. gr. the pectoral tendon is rolled up over the humerus, and the tension in the muscles is greater than in ov. gr. If one hand takes und. grasp the body rotates to the opposite side. In ov. gr. the expansion of the chest is chiefly transverse; in und. gr. it is sagittal.

By combination with preceding positions we get cr. hang., bend hang., arch hang., etc.

Yard pos.—The arms are lifted sideways to horizontal. According to the position of the forearms we have

Yd. a pos. (fig. 41. 2.)—Elbows drawn well back and flexed as far as possible; palms turned down; forearms and hands in a straight line.—Effect: tension in clavicular and pectoral chest, with increased apicial respiration; straightening of dorsal spine through contraction of rhomboidei and trapezii; shoulder-blades drawn toward the spine.

Yd. b pos. (fig. 41. 3.)—Elbows flexed at right angles; palms turned edgewise, radial border upward.

Yd. c pos. (fig. 40. 7.)—Elbows extended; arms and forearms in a line; palms turned down.—Effect: lateral expansion of the chest; straightening of axillary arteries, with consequent increase of afflux to the arms.

Yd. d pos.—*Yd. c* with palms turned up.—The outward rotation of the humerus increases the tension in the pectoralis major; consequently, as compared to the preceding position, the chest has been vaulted forward. The fixation of the shoulder-blades has also increased.

Yd. e pos. (fig. 40. 8.)—The forearms are vertical, palms turned toward each other.—The shoulder-blades have been drawn farther down, and the pectoralis minor brought into extension (the coracoid process being drawn backward); the expansion of the pectoral chest (with elevation of the sternum) is very great.

When only one side is to take the position, the figure 1-2 precedes the name, for instance: 1-2 str. wg. wlk. *b* st.; 1-2 Yd. *c* sitt.; 1-2 str., reach gr., stoop st., etc.

Movements.—Before entering into details, it might be well to state that when applying massage or Swedish movements the operator should place himself in such a position that he can accomplish the most with the least expenditure of energy; he should place the patient in the position which in passive movements will afford the ut-

most passivity and in active movements the proper muscular isolation.

At first but little force or duration is to be used, and a gradual increase is made only as the patient becomes accustomed to the movement.

When applying massage proper, no grease or lubricant is to be used (except in a few instances mentioned in Part II), unless the patient's skin is dry and scaly. Always apply as large a surface of the hand as possible, as this will increase the effect and save time. For more convenience divide the body into convenient spaces—from articulation to articulation—and finish one space before proceeding to the next. The general direction of the manipulations should be such as to favor the veunos currents—usually from the muscle's insertion to its origin; from the periphery of the body towards the heart.

When only one hand is employed, use the right hand for the patient's right side, the left for the left.

Muscles that are being *masseed* should be in relaxation.

Passive Movements :—

Friction.—Friction is applied on the bare skin; it may be dry or wet, rectilinear or oval. The wet friction, or rubbing with lubricants, is not used by skilled masseurs except when the skin is dry and scaly or when it needs

special medication, and in the few traumatic cases named in part II. Synopsis :

- Friction.
  - Kinds
    - Rectilinear — dry
    - Oval — (wet)
  - Mechanics
    - Insertion to origin
    - Along nerve or vessel
    - One hand
    - Both hands
      - Simultaneous
      - Alternate
  - Effects
    - Skin temperature rises
    - Effusions and exudations pushed along in capillaries
    - Cutaneous nerves
      - (a) Soothed
      - (b) Irritated
    - Brain and cord mildly stimulated
  - Uses
    - Introduction to kneading
    - Finish " "
    - Auxilliary " "
    - Primary procedure in special cases.

Friction is applied so that one hand steadies the limb while the other, enclosing the limb with a firm grasp, glides from below upward, and returns in such a manner that the up-stroke is heavy, the down-stroke light. "The manner in which a carpenter uses his plane represents this to-and-fro movement very well" (Graham). The pressure should not be so great as to chafe the skin. The movement can be applied with both hands, one on each side of the limb, so that one hand glides up while the other glides down.

This form is very soothing, especially if the hands describe curves instead of straight lines. Simultaneous strokes of both hands firmly enclosing the limb are occasionally used to remove excessive effusions, as in water on the knee, severe sprains, etc., (see part II); it is then applied with vaseline so as to save the skin. In case it is desirable to hasten the circulation in some particular vein or lymph vessel, this is best accomplished by sliding the thumb along its course, or by placing the cushions of the fingers across it, fingers close together, and rubbing in direction of the little finger (toward the proximal end of the vessel). This mode is commonly used when working on the jugular veins, the operator standing in front of the patient, who is sitting with his head tipped well back and face turned up so as to stretch the *fascia* of the neck. Friction along nerves is done in a similar manner.

It is hardly necessary to describe the friction on every portion of the body; for what has been said above, together with the hints as to position and spacing given under "*kneading*" will enable any intelligent operator to apply this procedure. Besides, friction is so unimportant and is used so little that no particular skill is required.

It may, however, be necessary to describe friction of the abdomen since this differs from that applied to other parts :—

The patient takes sit-lying pos. (fig. 2) with slightly elevated trunk; the operator sits on the patient's right side, partly facing him. He places his left hand edgewise, ulnar border down, at the beginning of the transverse colon, and his right hand similarly at the beginning of the descending colon; then he slides the left hand across the abdomen, and simultaneously the right one in a semi-circle toward the pubic crest, the left hand following, after it has reached the descending colon. The left hand turns an acute angle by pivoting on the little finger, so as to slide from the fingers in the downward movement. Starting from the first position of the hands, the procedure is repeated during five to ten minutes. The movement is best applied over the shirt or other protective covering, as the pressure must be considerable in order to affect the contents of the colon.

By friction the heat of the skin increases, not from chemical changes (as in kneading), but from the impeded motion, the rise of temperature being proportionate to the force of the pressure, the speed and duration of the movement.

The irritability of cutaneous nerves decreases, and consequently reflex irritability also lessens. The movement produces nutritive changes in the spinal cord, increasing its power of activity, and may even act mildly

stimulating on the cerebral functions (Dr. Geo. H. Taylor).

Prolonged friction increases nervous activity, and hence causes a growth of substance in the nerves; so as to lessen the tissues and functions of the muscles, etc. For that reason nervous and excitable invalids should not be given friction or "skin massage," since that would only tend to increase or exaggerate their symptoms. This is well proved by the numerous neurasthenics who have been "rubbed" and only grown worse from the so-called massage treatment.

The rise of temperature causes a dilation of cutaneous blood-vessels with consequent afflux to the surface; the effect, in a mild degree, resembles that of hot applications, *viz.*, a temporary diminution of pain.

Friction is used for its soothing effects as a preparatory measure to kneading, and is then applied gently; sometimes it follows the last named procedure, when the soporific effect of the latter is undesirable, and it is then applied briskly and forcibly. The movement is also used locally to hasten the flow in some particular vein in cases of local congestion, and to cause a suction in efferent lymphatics. On the abdomen it is used as a mechanical irritant to induce peristalsis, and to propel the fæces toward the rectum.

Kneading is executed so that the hand grasps as much muscle as it will hold or as the flexibility of the tissue will permit, and stretches it away from the bone in direction of the venous current, the hand contracting; the muscle is allowed to recoil while the hand relaxes; and the movement is repeated, care being taken not to glide on the skin.

Synopsis:

- Kneading.
  - Kinds
    - Rotary
    - Transverse
    - Vibratory
  - Mechanics
    - One hand
      - whole
      - cushions of fingers
      - tips of fingers
    - Both hands
      - alternate
      - simultaneous
  - Effects
    - Temperature rises 1° to 2°
    - Capillary circulation increases
    - Blood-pressure diminishes
    - Sensory irritability lessens
    - Mental activity "
    - Gentle stimulates / Hard lessens — growth
  - Uses
    - For general effects on circulation and neurition
    - Locally
      1. To reduce swellings and effusions
      2. To cause trophic changes
      3. To prepare for resistive movements

The greatest pressure should occur while the hand moves with the venous current, the object being to squeeze the blood out of the capillaries into efferent veins. Whenever possible both hands are used with alternating strokes as in friction, one hand contracting in its upward motion as the other relaxes and moves down. On large muscles, as on the thigh and arm, let the pressure be between the cushions of the fingers and the heel of the hand ; on small surfaces, between the fingers and thumbs. On large flat surfaces the pressure comes from the shoulders and elbows, while the hands are spread flat, fingers together and thumbs abducted. The motion is a graceful curve—usually outward upward—produced by supination of the hand rather than by abduction and adduction of the arm.

Begin at the central end of the part to be kneaded and work towards this end. After giving three or four malaxations in this place, move the hands slightly towards the distal end of the region and repeat the kneading, observing, when taking a new grasp, to let the hands cover part of that which has already been kneaded, so as to make sure that no portion is neglected. Kneading is usually described as beginning below and occuring upward, for instance, from toes to hips, from fingers to shoulders, etc. But it is evident that if the operator

begins above and works upward while gradually moving his hands downward, time and labor will be saved, as he has now a less column of blood to lift at the beginning and is constantly emptying the veins in advance of him, adding negative pressure in the veins to the pressure of the hands. The acceleration of the venous current will consequently be much greater. Besides, if any proximal capillaries or veins were occluded it would hardly be safe to begin the manipulations at the distal end. All writers prescribe this mode of kneading in sprains, synovitis, etc., and there is no reason why it should not be used in all other cases as well.

The manner of applying the hands differs somewhat on different parts of the body, and to make the kneading smooth, agreeable and efficacious, the following positions will be found the most convenient.

Arm. The patient reclines with one hand resting in the operator's lap. The operator sits facing the patient, grasps the biceps in one hand, the triceps in the other, and moves his hands as described above, from shoulder to elbow, applying his pressure upward.

Fore-arm. The hand is in supination. The masseur lets his thumbs follow along the median of the anterior surface, the fingers working on the under side while the thumbs work on the upper side.

Hand. Pronated. Thumbs follow median of dorsal

side stretching the tissues outward upward, while the fingers manipulate the palmar side. The palm may also be kneaded separately with one hand, the cushions of the fingers working from the median outward, while the patient's hand is resting in the operator's opposite hand.

Fingers. One finger in each hand, the strokes being simultaneous; or both hands working with alternate strokes on one finger at a time. This last method requires more skill but is more efficacious.

Thigh. The patient's leg, with semiflexed knee, is resting across the operator's lap. The operator grasps the quadriceps in one hand and the hamstring muscles in the other, stretching the tissues from the median of the inside. On a large thigh it will be necessary to knead the outside separately, and this is best done when the patient is lying face down.

Knee. The joint extended. The cushions of the fingers work on each side of the patella.

Leg. The patient's foot is resting in the operator's lap, the knee being flexed so as to relax the muscles of the calf (cr. *a* pos.). The operator's thumbs stretch the anterior muscles away from the edges of the tibia, while the fingers manipulate the calf. The calf may also be kneaded separately with the patient in prone ly. pos., the foot resting against the operator's waist.

Foot. The cushions of the fingers around the malleoli. The dorsal surface as on the hand. The plantar surface with the fingers of one hand applied at right angles, while the other hand steadies the foot by grasping the dorsal side. The toes as the fingers.

Abdomen. The patient reclines with feet drawn up and supported so as to relax the muscles of the abdomen. The operator sits on the patient's right side, places his right hand across the patient's abdomen and gives a rotary motion, the heel of the hand pressing along the ascending colon and the fingers along the descending colon, the general direction being from the right iliac fossa upward, across and downward, care being taken not to press upon the innominate bones or upon the umbilicus. The hand at the same time performs a slight movement of contraction and relaxation. A transverse kneading of the small intestines can be done by both hands applied parallel across the abdomen, and simultaneously doing a wave-like movement of contraction and relaxation, the pressure alternating from the heel of the hand to the fingers. Deep kneading of the colon can be done by the fingers of one hand, beginning in the left iliac fossa and working downward while gradually moving backward along the colon.

The stomach is sometimes kneaded specially and also the epigastric region by the fingers of one hand.

The liver is kneaded by the right hand grasping the waist just below the ribs, fingers in front, thumb behind, and alternately contracting and relaxing without rotary motion.

Chest. Finger-tips in the intercostal spaces, and the palms of the hands from insertion to origin of pectorals, one hand for each muscle working with alternate strokes.

Back. The patient is lying face down with arms extended sideways (yd. *c* pos.), or hanging over the sides of the couch. This position relaxes the muscles of the dorsal region the best. The operator stands at the patient's head facing him, and works from the spine of the scapula to the sacrum, the thumbs following each side of the spinous processes, the hands spread out with fingers together. The pressure, which is done with the whole hand, should occur in direction downward outward. The strokes are alternate as usual. If the patient is in bed, the masseur is usually obliged to stand or sit on one side. It is then most convenient to manipulate with one hand, the other placed on the top and at right angles to the working hand. (On the right side the right hand is under, on the left, the left) ; as before, the tissues are stretched from the median, downward outward.

If the glutei are to be manipulated, it may be done by one hand, while the other one works along the spine,

both moving in circles from the distal ends towards the waist where they meet In this case the strokes are simultaneous.

Shoulders. — Patient sitting, operator stands behind and works with the cushions of his fingers from the acromion, along the supraspinatus, to the spine The strokes may be simultaneous, one hand on each shoulder or both hands may manipulate one shoulder, one resting on the other, fingers crossing at right angles, the right hand under for the right side, the left for the left. The deltoid can be kneaded separately by both hands, the thumbs working from the median upward outward while the fingers steady the hands on the chest and back.

Neck. — Position as for the shoulders The kneading is applied from occiput to scapula, and from occiput to sternum. For the first manipulation the operator stands in front of the patient; for the second he stands behind. The neck can also be enclosed in both hands as described for the limbs. The masseur then stands in front the patient leaning forward with his head resting against the operator's chest. The strokes are alternate the thumbs working from the occiput downward outward

Head. — Patient sitting. The operator standing in front steadies the head with one hand while working with the other from the sagittal suture backward outward, taking care not to glide on the hair. The whole hand is

used over the parietal region and on the vertex, the cushions of the fingers in other places; and the general directions of the manipulations is from the "frontal suture" toward the occiput. Special attention is given to the eyebrows and to the inferior occipital region. The eyebrows are grasped between the thumb and the index finger and squeezed and pressed toward the nasion, both sides being worked with simultaneous strokes, and the hand moving from the nasion outward. The special massage of the eye will be described in another place. The face and nose can be worked with the cushions of the fingers, usually one side at a time, the other hand steadying the head. In special cases the facial muscles may be worked between the thumb inside the mouth and the fingers outside.

Internal massage can be applied to the nose, pharynx, larynx, uterus, rectum, etc. but will not be described here as they require special training and special skill, and should not come into the domain of the average masseur.*

In all kneading remember to bear on hard enough not to glide on the skin, yet not so hard that the tissues become crushed on the bone nor so as to bruise the capillaries. Make the rotary motions as large as the extens-

*The student is referred for literature on internal massage to Major Brandt's treatise to articles by Dr Graham, Dr Hogner, Prof Cederschiold and others

ibility of the tissues will allow, but do not try to stretch a muscle in two directions at once While kneading is best executed on the bare skin, it can, however, be done through the clothing. The pressure must then be heavy enough to prevent the clothing from gliding on the skin. Whenever kneading is used for strictly local purposes, as in sprains synovitis, etc., it would be a mistake not to remove the clothing Do not put much speed into the circuitous movements, but work leisurely, as it will be found that the massage of the mild and slow type is usually more efficacious than that of the violent and rapid type.

Some nervous persons find the rotary kneading unbearable, and it may then be changed into a rectilinear squeezing, each hand alternately contracting and moving from portion to portion of the limb as in ordinary kneading On large surfaces, as the back and shoulders, the hands may move in a straight line, the tissues being picked up by the thumb and fingers, one hand following the other, and one grasping before the other one lets go

Another form of kneading is the so-called muscle-rolling, which may be used on arms and legs as follows: The hand, with straight fingers, are applied across the limb (at right angles), one on each side, and with a rapid, alternate to-and-fro movement they are made to slide from one end of the limb to the other, the muscles mean

while becoming rolled between the two hands This is often used as a finish off to ordinary kneading Many other modifications may be invented to suit different cases and conditions. and will need no special description.

Effects of Kneading. — The tissues are squeezed like sponges blood and lymph vessels become alternately emptied and refilled, the venous circulation and reabsorption increase: physical impediments to capillary circulation is removed, and the transudation of nutritive supply is favored. Moderate kneading encourages muscular growth, while prolonged or violent kneading diminishes it. The temperature rises 1° to 2° (on account of nutritive changes), the skin becomes more flexible, and insensible perspiration increases. Sensory irritability diminishes. while motor irritability increases The general blood pressure diminishes on account of the increasing vis-a-fronte in the veins, and the heart-beat diminishes in frequency.

Kneading is used as a general procedure whenever it is desirable to lessen the blood pressure and heart-beat by hastening the venous currents. and the patient is too weak for other forms of passive movements. It is applied locally to venous congestions. transudations, effusions, etc.; to make hardened muscles. ligaments and tendons more pliable; and to prepare muscles for active

work. For it has been proved that fatigued muscles quickly regain the power of contraction when subjected to kneading; and also, that muscles so treated possess greater endurance than if not kneaded (Zabludowsky), *i. e.*: if a muscle is *massed*, it can contract during a longer period with less fatigue, or during a shorter period with more force without increase of fatigue.

While friction reaches merely the superficial vessels and nerves, etc., kneading extends its effects to deeper layers as well, and consequently is far more efficacious than friction.

Circumduction — Some part of the body describes with its longitudinal axis the surface of an imaginary cone, the base of which is at the free end of the part moved, and the apex at the joint in which the movement takes place (Roth). Some writers (Geo H. Taylor, Ostrom etc.), have erroneously named this movement rotation, which, however, is an entirely different procedure, anatomically and gymnastically.

Circumduction can be active or passive. In all descriptions and prescriptions below, the abbreviation "circ." refers to the passive movement, unless the word "active" precedes it.

Effects of Passive Circumduction. — Prof. Loven states (*Var Tids Forskining No.* 17 †) that "at the greater number of the articulations, but especially around the hip

† Larobok i Sjukgymnastik by T. J. Hartelius, M. D., Stockholm 1883

and shoulder-joints, as well as at the lower part of the neck, the superficial part of the walls of the veins is usually fastened on aponeuroses and fasciæ, which by certain movements are extended so that the veins are expanded. This causes in these veins a suction which powerfully accelerates the return current. By the alternate motions of the joints the veins may thus be alternately extended and contracted, filled with blood and again emptied. This is true not only of the extremities, but also and especially of the largest of all the veins, the inferior vena cava, which is so located along the front of the spine that it must follow the movements of the latter. If the thorax be bent forward, this vein becomes highly contracted, again to expand when the trunk is straightened. Experiments have proved that the capacity of the vessel largely increases at such extension It is easy to understand how at every extension and still more at backward flexion of the trunk, a suction is caused in all those veins which supply the inferior vena cava, especially in those of the lower extremities. A similar condition takes place in the veins of the arms when these are extended sideways and somewhat backward, with the hands closed. Finally, as regards the jugular veins, these are the most extended when the head is bent backward with upturned face."

The flow of the lymph is accelerated in proportion

with that of the blood, the negative pressure, as described above, causing a suction in the thoracic duct and also secondarily in peripheral lymph vessels.

Synopsis

Passive Circumduction.

- Kinds
  - Slow
  - Fast
- Mechanics
  1. One hand steadies moving joint, the other grasps near the next
  2. Speed. less for large limb, greater for small
  3. Duration limited by sensation of resistance
  4. Circle as large as joint permits, or as effect demands
- Effects
  1. Blood drawn from moving limb
  2. Absorption increased by molecular revulsion
  3. Tendons, ligaments, fasciæ made more pliable
  4. Articular adhesions removed
  5. " cartilage made thinner
  6. Soporific
- Uses
  1. Diminish blood pressure
  2. Increase return current from any region
  3. Substitute kneading
  4. Prepare for kneading.

It is then evident that passive circumduction is a means of pumping the blood from the region put into

motion. At the same time centrifugal force, increasing with the speed of motion, draws the arterial current into the region. By this means the vis-a-fronte becomes increased both in veins and arteries, and it necessarily follows that as the peripheral resistance diminishes, the heart's action will decrease. Waste matter present in the venous current is carried off with greater speed, and as the movement causes a vibration throughout the part put into motion, venous absorption increases, especially in the vascular tissues of the articulations. Adhesions become broken up and the mobility of the articulation increases.

Circumduction has that in common with all continuous rotary motion of inducing a relaxation of attention — acting as a hypnotic.

The speed of motion is dependent partly upon the mobility, so that the movement is done slowly and tentatively in cases of stiff joints, moderately fast in others, partly upon the object of the movement, so that it is done quite slowly when the effect of increased efflux is the chief desideratum, quickly when the object is to increase the afflux.

The duration of the movement is determined by the muscular resistance which soon occurs in the patient (by fatigue-reflex), and which indicates that the movement has ceased to be passive, *i. e.*, has ceased to produce the above effects.

Whenever it is desirable rapidly to diminish the blood-pressure, circumduction of large articulations is the best procedure. And when passive hyperæmia exists in any region, this movement applied to that region will quickly increase the return current from it. When kneading is to be given to a limb with highly engorged capillaries, it is well to use circumduction as a preliminary measure to produce a suction in the efferent vessels, and so hasten and favor the effects of the kneading. When kneading is applied for its general effects, it may, in a great many cases, be substituted by circumduction, as this saves time and effort, the last-named procedure being less tiresome to the operator, often more agreeable to the patient, and always more far-reaching in its effects. What friction accomplishes superficially, and on a very small scale, kneading will affect on a larger scale; and circumduction will do it still more extensively. (Compare synopsis of classification of medico-gymnastic movements).

Effects of Active Circumduction.—It may be as well to mention these here as a matter of comparison: the venous circulation in the moving part becomes retarded on account of the active contraction of the muscles around the articulation. The afflux increases proportionately to the speed of motion; cerebral influence to the part increases; and the heart's action is accelerated,

partly on account of the increasing arterial resistance, partly by reflex. Prolonged the movement will cause active hyperæmia, which is the reverse of the effect of the passive movement.

We will now turn to a consideration of the mechanics of the principal passive circumductions.

Reclin. F. circ. (fig. 42.) Patient reclining (fig. 8). Operator sits with one of patient's legs across his lap fully supporting it, so as to keep it straight from hip to ankle. To that end the operator keeps his inner thigh somewhat lower, so as to allow for the expansion of the

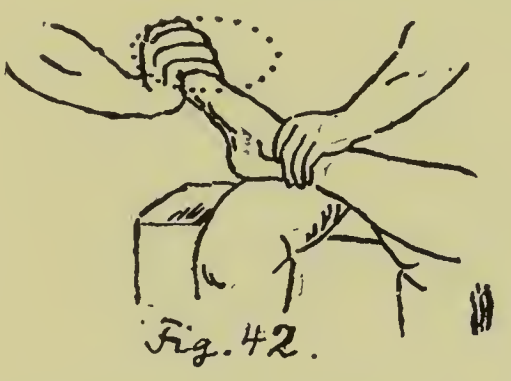
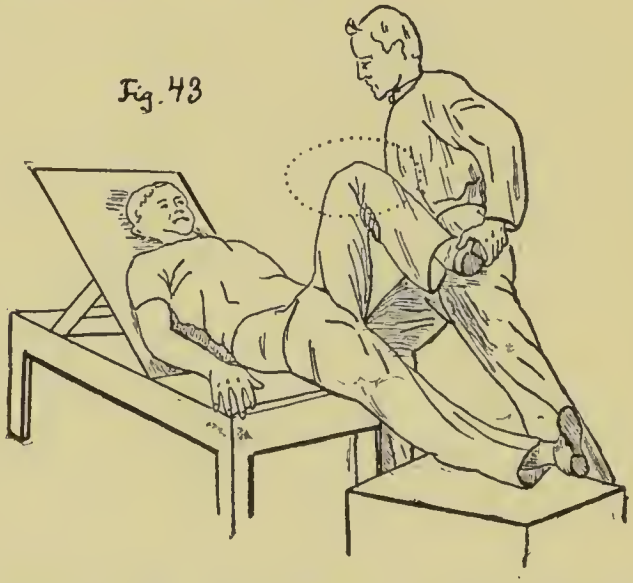


Fig. 42.

calf; the patient's heel should be fully outside the operator's outer thigh, so as not to interfere in moving. Operator grasps patient's ankle with one hand, so as to steady it, and holding the metatarso-phalangeal articulations with the other hand. he makes the toes describe a circle eight to sixteen times to one side, then to the

other. The movement is done with utmost speed when used for circulatory effects; slowly and tentatively when applied for increase of mobility. It is evident that after sprains, in arthritis, etc., the circumduction must be very slow and cautious, so as not to cause pain or distortion of tissue. The movement is used for its general effects upon the circulation, as well as for local, articular effects.

For the right foot the operator sits on the patient's right side, and does the movement with the right hand; on the left side the left hand should be used. If the patient is in bed, let the mattress support the leg and proceed otherwise as just described.



Cr. a *Reclin. Hip circ.* (fig. 43.) For the left side: Operator in fallout pos. on the right foot grasps patient's

foot with his left hand in the hollow of the foot, thumb on the inside ; the other hand grasps the leg from behind, and just below the knee, fingers on the inside* (without pinching or squeezing, merely supporting). The limb is bent at hip and knee and a circumduction is communicated to the hip, by the right hand making the knee describe as large a circle as possible, first to one side, then as many times to the other. The movement is usually begun outward and also ended outward, the inward circumductions intervening. Care should be taken to keep the joints well bent ; not to let the knee pass the median of the body (so as not to squeeze the bladder), and to keep the foot well inward so as to save the ligaments of the knee. The upper hand does most of the movement, the lower hand merely supports the leg. The movement should be done rather slowly. If the knee is stiff, the circ. must be done with straight leg, the effect then diminishing.

The other leg should be supported so as to prevent the patient from slipping. The patient may be lying instead of reclining. For the right leg, the operator stands on the patient's right side, the left hand becoming the upper one, the right the lower.

The movement increases the return current from the

* Old-fashioned operators keep this hand ON the knee ; but this makes an unsteady movement, and affords less support to the leg.

leg and pelvis, and especially accelerates the flow in the iliac veins. It is used in disorders of digestion and in all diseases where pelvic congestion is a predominant symptom (or a cause). It may also be applied for its general effect upon the circulation, and also as a means of increasing the mobility of the hip-joint.

Str. ly 2 Hip circ. Patient lying with arms extended upward and grasping the edges of the couch (or some other fixed object). The operator stands in stride position facing the patient and grasps his leg just above the ankles. He then swings the patient's legs in a large circle, first to one side, then to the other, taking care to keep the patient's feet together and his knees straight. The operator should try to get his swing from his knees, as this will save his back considerable labor.

The movement increases the vis-a-fronte in the mesenteric veins (and to a small extent also in the inferior vena cava), and produces an artificial peristalsis. The sum total of effect will be increased intestinal absorption, so that the movement becomes very useful in disorders of digestion. It may also be applied in pelvic disorders, although in these the preceding movement is to be preferred.

(Care should be taken not to swing the legs below horizontal, so as not to cause unnecessary tension in the abdomen. The effect can be very much increased by

letting an assistant apply pressure inward upward on the abdomen during the upward movement of the legs.)

Finger circ. (fig. 44.) Operator faces patient and grasps one of his fingers between two of his own (flexed; the 1st phalangeal joint used for grasp), and while supporting the metacarpo-phalangeal articulation with the other hand, he moves the patient's finger in a circle a number of times each way. The speed and sphere depend on the mobility of the joint. The right hand gives the movement to the patient's right hand, the left to the left.

The movement is used only as a local procedure in arthritis, sprains, etc.

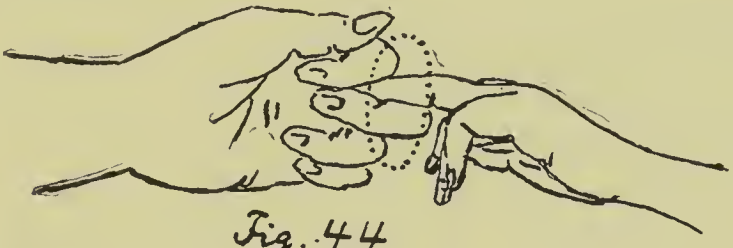


Fig. 44.

Fig. 45.

Fig. 46.

Hand circ. (fig. 45.) Patient reclining, sitting, or standing; operator stands on one side of him, facing the same

way. Grasp with proximal hand just above the patient's wrist, and from its palmar aspect, the operator's forearm crossing the patient's and holding it against the operator's chest (for better support). The distal hand (right for right side, left for left side) grasps the patient's clenched fist from its dorsal side, so that the operator's thumb crosses the patient's at right angles, the fingers resting over the latter's fingers. (The operator's hand is flexed chiefly at the metacarpo-phalangeal articulations, the fingers being nearly straight, and thumb and index finger meeting.) This hand is now moved in a circle first to one side, then to the other, — rapidly if for circulatory effects, slowly if for articular. The movement is used chiefly to promote mobility of the wrist, to break up adhesions, and polish articular cartilages, etc. It is then well to press the articulating bones firmly together while moving, so as to make sure of a steady movement.

Bent A circ. Patient reclining. Operator sits facing him and places his distal hand (left for the right side, and *vice-versa*) as a support under the patient's elbow; the other hand grasps the patient's forearm just above the wrist and makes the hand describe a fairly large circle, the elbow being bent throughout the movement. The circumduction produces a changing flexion of the elbow and a rotation of the humerus. Effects on circulation are slight, but the head of the humerus is rubbed under the

acromion, and adhesions and thickenings of cartilage and tendons become worn off. The movement then is useful in arthritis and periarthritis of the shoulder.

Yd. c. *Sitt. A. circ.* (fig. 46.) Patient sitting. Operator stands behind to one side, places his proximal hand (left for right side) on patient's shoulder to steady it, grasps with his distal hand just below the patient's elbow and makes the arm describe a large circle upward backward, downward forward. The distal hand grasps from underneath (palm up) without squeezing or pinching. The arm should not be allowed to flex at the elbow, and it should be moved in only one direction, as the reversing would tend to compress the chest. The alternate extension and relaxation of the veins around the joint causes a suction in its afferent vessels, so that the movement becomes a means of pumping the blood out of the arm, doing for the large vessels what kneading of the arm would do for the smaller. The movement is used for its effect on the general circulation ; as a local procedure to prepare, increase, or substitute the effect of kneading ; also to break up adhesions in the shoulder. When used for circulatory effects, the circumduction is rather rapid ; when used for articular effects, quite slow. (Compare hand circ.)

Str. sitt. A. circ. (fig. 47.) Patient sits with arms extended upward. Operator stands on the couch behind

with his leg and thigh supporting the patient's back. He grasps the patient's hands so that he has hold of the patient's thumbs, the patient of his (the patient turns palms inward, the operator palms outward), and while stretching the arms well he moves them in a small circle forward outward, backward inward, taking care not to strike the arms against the head and not to rotate them outward. The movement is not reversed, so as not to compress the chest.

Fig. 47.

Fig. 48.

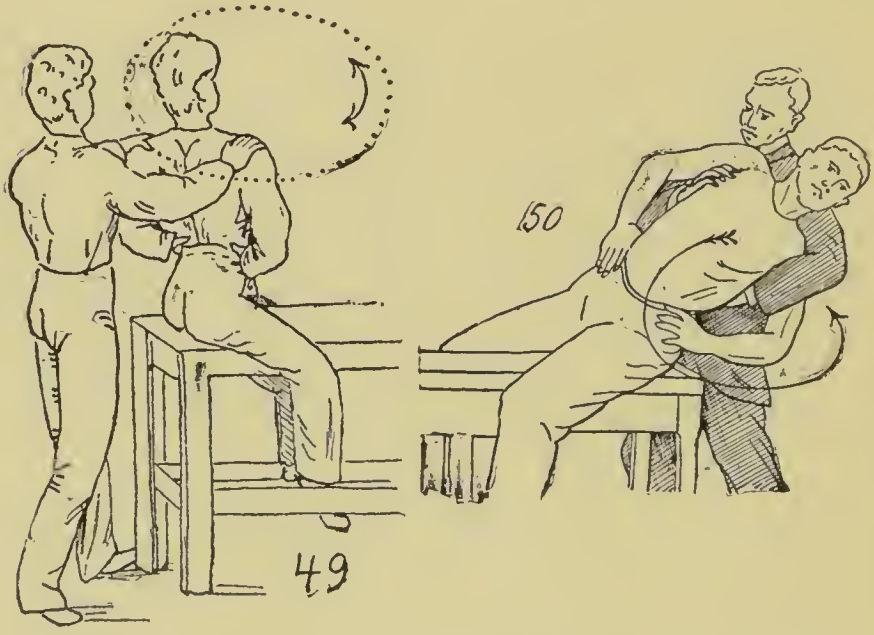
The chest becomes highly expanded, a suction arising in the superior vena cava and in the pulmonary artery; meanwhile the blood is drawn out of the arms, and the apex of the lungs are brought into vibration. The total effect will be an increase of pulmonary circulation, and

bronchial absorption ; the mechanical afflux to the chest causes a diminution of the general blood pressure and makes it negative in abdominal and pelvic vessels. The more the trunk inclines backward (reclin. and ly pos.), the greater will be this last-named effect, for now the muscles of the abdomen become tense, the arch flattens and forces viscera upward. The str. ly 2 A. circ. will then be of exceptional value in abdominal and pelvic congestion, while the str. sitt. 2 A. circ. is more useful where pectoral expansion is the chief desideratum. The movement from reclin. pos. has effects midway between the two, and would be preferred as a general movement for circulatory effects.

A modification of the movement (with reverse direction of motion) is shown in fig. 48, the arms bending and stretching while the hands describe circles as before. Its chief utility is in muscular rheumatism of arms and shoulders, when the patient is able to bear so violent a movement.

Wg. ride sitt. T. circ. (Fig. 49.) The patient sits astride a high couch with feet fixed (or astride a chair with feet under a bureau, or radiator, etc.) and hands on hips. Standing behind, the operator grasps the patient by the shoulders and moves the latter's trunk rather slowly in a large circle several times in one direction, then in the other, and repeats as required. The circle

should not pass backward beyond the vertical commencing pos., as this would tend to compression of the chest; and the patient should make the effort of keeping back and neck erect. The movement causes a suction in the inferior vena cava (see above), and alternately compresses and distends the mid-abdominal viscera, increasing the vis-a-tergo of their venous supply; so that there is a duplicate hastening of the return current from this region. The movement, then, becomes useful in cases of ab-



dominal (and pelvic) hyperæmia, and is a much used exercise in disorders of digestion. If some degree of speed be put into the movement, cerebral congestion will result,

centrifugal force driving the blood to the part nearest the periphery. In this way the rapid movement becomes useful in cases of cerebral anæmia, cortical malnutrition, etc., and may be indicated in certain mental disorders.

It should not be forgotten that the vertebral veins are put into oscillatory extension, so that their contents become emptied with greater speed.

Wg. ride reclin. T. circ. (Fig. 50.) The patient sits astride the high couch with feet fixed and hands on hips. The operator stands in stride position behind the patient and close to him, places one hand under the patient's axilla, and lays his other arm over the patient's other shoulder. The patient reclines against the operator, who puts his hand through the space between the patient's arm and thorax, and rests it in the small of the latter's back. A circumduction now takes place forward outward ten to twenty times. To reverse, the grasp is changed, so that the movement always occurs to the side of the over-grasping arm. The circle should not pass the median (vertical of com. pos.), and should not be layed too far forward. The patient should be fully supported throughout the movement, so as not to be forced into muscular effort of the abdomen for equilibrium. In absence of a high couch, the movement can be done with the patient astride a chair with feet fixed (as above). The operator then kneels upon one knee

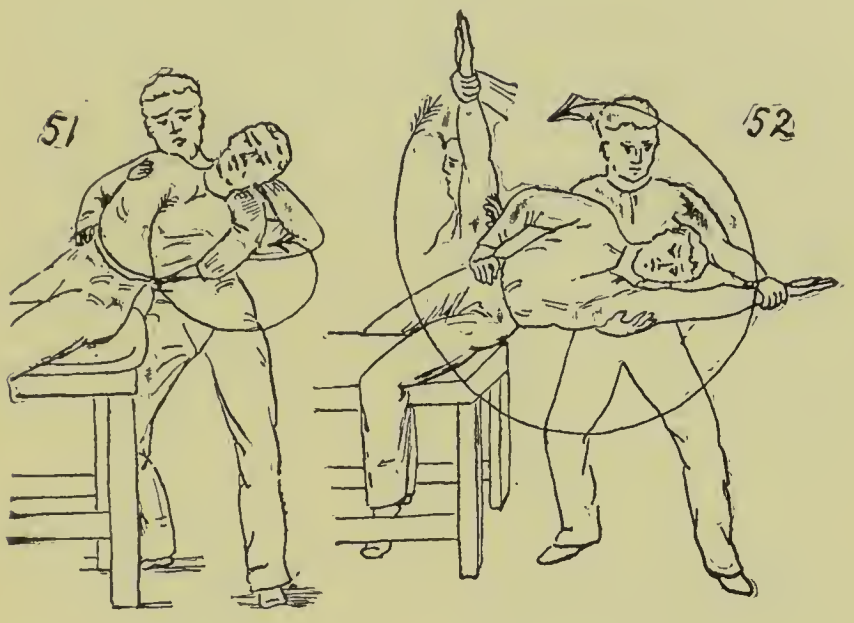
(the knee of the side to which the circumduction occurs), this knee being placed on the floor in a line with the median of the patient's body. It is exceedingly tiresome for the operator to give the movement in this situation, but it is too useful to be omitted in absence of the high couch.

The vascular negative pressure is similar to that of the preceding movement, but located somewhat higher, the effect being chiefly upon the portal vein. The chest and abdomen become more extended than in the preceding movement, giving more thoracic aspiration and pelvic venous vis-a-tergo. Also, the patient is entirely passive, so that there can be no increase of arterial pressure (of which there is a trace in the preceding movement). The exercise is a favorite with a majority of operators.

1-2 *Rest ride reclin. T. circ.* (Fig. 51.) Resembles that just described, except that the patient's distal arm (side of the circ.) is placed with hand behind the neck. This gives a stronger tension in the chest on that side, the focus of effect becoming located higher (hepatic veins?); and there is more internal elevation (*i. e.*, viscera are more forcibly drawn up).

1-2 *Str. wg. ride reclin. T. circ.* (Fig. 52.) Patient on the high couch with one arm in wg. pos., the other in str. pos. Operator stands behind, facing to the side of

the patient's str. arm, and with his corresponding foot (left for left) slightly advanced. He places his proximal



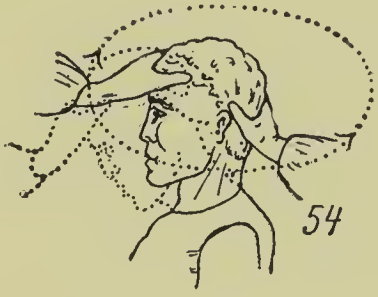
arm across the patient's back, the hand in the axilla, and with his other hand (pronated) he grasps the patient's str. arm just below the wrist. The patient now reclines over the operator's proximal arm, with his head leaning against the latter's chest, and the operator gives a circumduction outward, backward, upward, by making his whole body move, so as to retain his contact with the patient. To reverse, the operator faces the opposite way, and grasps correspondingly. To make the motion smooth, keep a very flexible knee, and let the distal

hand merely steady the patient's arm without pressing on it.

The movement is an exaggeration of the preceding, the three forming a sequence of progressive steps from the "gentle to the strong," if such an expression can be used about passive movements. At all events, the extension of the chest is quite forcible in the last movement, giving more thoracic aspiration, and the alternate compression of the liver is much more complete (in the circumduction to the right side). The movement is introduced into the prescription only after the other two have ceased to be effective.

Str. gr. st. T. circ. (Fig. 53.) The patient stands grasping the horizontal bar (or other stationary apparatus) with hands in over gr., and somewhat less than shoulder-width apart. The operator stands to one side, and, placing one hand on the patient's abdomen, the other on his sacrum, he makes the patient's body describe a circle six to ten times to one side, then to the other, the patient retaining his feet on the floor and keeping his head well erect. The tension in the arms causes a chest-expansion much in excess of that in the preceding, and the venous currents are forcibly drawn toward chest and arms. The afflux increases towards the middle of the abdomen; the pressure in pelvis and legs diminishes;

and the movement becomes a powerful means of increasing the nutritive metamorphosis in liver and stomach. It is an excellent procedure for constipation and dyspepsia, if the patient is not too weak for such intensity of motion. The effect of internal elevation is forcible on account of the position of arms and chest, and can be made still stronger by pressure from the anterior hand; so that the movement might also be useful in certain female diseases.



Sitt. H. circ. (Fig. 54.) The patient sits erect (fig. 10.) with his hands on his knees, the operator standing on his left side and grasping his head between his hands, one on the forehead, the other under the occiput. The

operator makes the patient's head slowly describe a large circle eight to ten times to one side, then to the other, etc.; the anterior hand furnishing the backward movement, the posterior one the forward and sideways motions. The head should not be rotated, but the face should be turned straight forward throughout the movement. When stopping the movement, keep the patient's head steady in upright position before removing the hands, so as to prevent dizziness.

The fascia of the neck becomes alternately stretched and relaxed, and with it the vessels around the neck, especially the jugular veins: the movement becomes a means of pumping the blood out of the head, releaving cerebral hyperæmia. The circulatory revulsion in the brain causes a diminution of attention, a lessening of mental activity; and experience has proved the movement to be an excellent hypnotic.

The muscles around the neck are stretched and relaxed (especially the sterno-mastoids, the scaleni, and the trapezii), removing rigor in muscular rheumatism; torticollis, etc.; and the gliding of the occipital condyles in their sockets tends to heighten the mobility of the occipito-atloid articulation, making the movement of good use in rheumatoid arthritis involving this joint.

If the movement is given with considerable speed, the arterial current is driven toward the head with increased

speed, which effect becomes useful in cerebral anæmia. On the other hand H. circ. should be avoided altogether in hemiplegia, paraplegia, etc., unless it is given with the utmost precaution.

From the above it will be seen that friction, kneading, and circumduction, all affect chiefly the venous currents, the first the superficial ones, the second those somewhat deeper, and the last the deepest; that they are movements of resorption; that they can substitute each other; that circumduction and friction are both excellent introductory measures to kneading in cases of oedematous, effusions, extravasions, etc.; that either of the three are suitable procedures to apply to any given part to draw the blood from it; that they are as useful to lessen the general blood-pressure, and so secondarily diminish the heartbeat; and that, no volition being involved, the movements favor general relaxation, and so become useful in a large number of cases of overworked "nervous" invalids, who need the effects of exercise, but who lack the strength necessary for active gymnastics.

It should be stated in conclusion that skilled operators never use kneading where circumduction will do, but reserve the former for special (local) massage; and that they use friction very sparingly, and in the majority of cases not at all.

On movements of neurition in general.— Whenever an impulse passes through a nerve, it is transmitted by vibration, a condensation wave travelling through the axis-cylinder from end to end. In normal condition of the nerve its wave has a definite maximum and minimum speed and density; in disease, these two factors change, *i. e.*, the irritability of the nerve decreases or increases. The experiments of Drs. Granville, Berghmann, Tigerstedt, etc., as well as the experience of all skilled masseurs, make it safe to state that all sharp shooting pains correspond to excessively rapid, sensory waves, while dull, continuous aches correspond to slow and dense waves; that quick, incoordinated movements are caused by a too rapid motor radiation, while abnormally weak and unsteady movements result from slow waves; and that sensory or motor paralysis is the expression of non-vibration, or at least absence of a strong enough wave to connect periphery and centre.

It has been shown (Zederbaum) that a sudden and heavy pressure on a nerve rapidly decreases its irritability; and a pressure, gradually increasing to the same degree, causes a slower, and less perfect diminution of irritability. And repeated experience in sciatica, trifacial neuralgia, etc., proves that, if continued with sufficient force and duration, pressure upon sensory nerves

at first causes an increase of pain quickly followed by anæsthesia. That is, pressure upon a nerve annihilates the possibility of its vibration, and is then indicated whenever it is desirable to diminish the irritability of sensory or motor nerves—generally, to regulate abnormally rapid vibrations. (Luderitz states that motor fibres are affected more quickly than sensory ones.)

Experiments with percussion have shown that light percussion of sensory nerves causes an increase of pain, soon followed by its diminution, and finally total cessation; that slow and heavy percussion causes exhaustion of the nerve; that light percussion for a short period on motor nerve increases the contractility of corresponding muscle; and that prolonged percussion produces paralyzation. It has also been shown that rapid, springy blows break up a dull ache, while slow, dull blows relieve shooting pains.

If a string were in rapid vibration and a slow wave were sent into it, the second wave would break up the first, an average of the two resulting. Just so the dull percussion and pressure are related to shooting pains and spastic movements; while the rapid percussion would bear the corresponding relation to dull aches and akinesia.

If a whole limb has become paralyzed, it would be an

endless task to give percussion to the several nerve-branches affected, and it is then far simpler to put the whole limb into vibration at once, when all its nerves will become affected by the molecular revulsion. The movement of vibration is used in that manner as a multiplication of percussion to reach larger areas and to substitute percussion where the latter cannot be applied.

In motor nerves impulses travel from centre to periphery, and it may happen that the wave starts with normal rhythm, but changes on account of the plasticity of the nerve. It would then save time to apply the manipulations from periphery to centre, so as to produce a peripheral wave that may blend with the central one, making continuous undulations from end to end, while it would take longer to produce this result if working from centre to periphery. Practical experience seems to confirm this theory, even in cases of paralysis of central origin.

On the other hand, in sensory nerves the object of mechanical interference is to prevent the impulse from reaching the central end, and it will then be a saving of time to apply the procedure at this end first and work towards the periphery. In cervico-brachial neuralgia, extending into the serratus magnus and down to the elbow, pressure on the brachial plexus over the first rib

stops the pain much more quickly and effectually than pressure beginning at the elbow and moving up. Likewise in sciatica, pressure from the gluteal region downward will accomplish far more in a shorter time than pressure beginning below and working upward.

We then arrive at the following general rules : a) To lessen neural activity, give pressure or prolonged percussion ; to increase it, give brief percussion or vibration. b) For motor disturbances work from periphery to centre ; for sensory disturbances from centre to periphery.

Pressure is entirely local in its effect, percussion somewhat more extended, and vibration is quite general, these procedures having the same inter-relation as friction, kneading, and circumduction.

Extension of nerves is also a valuable procedure, having effects similar to those of pressure, moderate extension increasing the irritability, prolonged extension diminishing it (Tigerstedt). In the treatment of sciatica, or whenever the nerve can be stretched without surgical interference, this procedure is even more valu ble (for permanency of effects) than any of the preceding.

Pressure.

Synopsis : —

PRESSURE.

- Kinds :
  - Stationary
    - continuous.
    - intermittent.
  - Translatory.
- Mechanics :
  - Cushions of fingers.
  - Knuckles.
  - On nerves.
  - On vessels.
- Effects :
  - a) Increase } of nerve-vibration.
  - b) Inhibition } of nerve-vibration.
  - Local increase of
    - blood-pressure.
    - absorption.
- Uses :
  1. Sedative in neuralgic pains.
  2. To cause local paralyzation of muscle.
  3. " " secundary increase of circulation.
  4. As substitute for heavy percussion.

Pressure is given on nerves or vessels with the tips [cushions] of the fingers either applied rather suddenly, and steadily increasing in power, or intermittently to form a local vibration. It may be applied along the nerves so that the hand moves from place to place and presses at each stopping ; and it may be given by the knuckles, when it must reach through thick muscles.

The first effect of continuous pressure on sensory nerves is pain, followed by loss of sensibility ; on motor nerve first tremor of corresponding muscle, later its paralyzation. The effect disappears slowly, and will, if reproduced with sufficient frequency lead to a permanent change of neural activity, so that the procedure becomes a means of stopping neuralgic pains and of their permanent removal ; also of stopping abnormal muscular contractions. Intermittent, or vibratory pressure, increasing or producing vibrations of the axis-cylinder, becomes a means of breaking up local anæthesias and of stimulating paralyzed motor nerves, and may in this manner serve as a substitute for percussion or vibration when an extremely local procedure is needed.

Pressure may also be applied on veins or arteries as a means of temporarily increasing the blood-pressure, and so cause a hastened flow when the hand is removed ; or to cause a temporary diminution in arterial supply to congested or inflamed parts. The compression of arteries is however too delicate a procedure for the average operator, and he is advised to leave it alone, as also not to attempt nerve pressure until he is absolutely sure of finding the nerve, so that he will not instead bruise the walls of adjacent arteries, and so produce a worse condition than that already at hand. Masseurs are

also reminded that nerve-pressure is contra-indicated in neuritis.

Below are described the main forms of local nerve-pressure:

On the head. — TRIGEMINUS, frontal branch Face the patient. Steady the hand by the fingers on the temple and press the cushion of the thumb on the supraorbital notch inward upward (The notch is found by drawing a vertical line from the inner corner of the eye.)

Malar branch : steady the fingers under the occiput ; press the cushion of the thumb on the infraorbital foramen upward. (The foramen is found by drawing a vertical line from the corner of the eye.)

Mental branch: steady the thumb under the jaw, and press the index finger on the mental foramen (found by a vertical line from the corner of the mouth.)

Gustatory branch : steady the little finger under the symphysis of the jaw, the thumb on its outer surface near the angle ; roll the index finger in under the jaw and press it against the inner surface at a point marking the first third of the distance from angle to symphysis. — These procedures are used in trifacial neuralgia, etc.

FACIAL nerve : press the index finger on the inferior maxillary bone just under the condyle at a point level

with the margin of the lobule of the ear. — Used in facial neuralgia.

PNEUMOGASTRIC nerve : press the index finger in the groove between the condyle of the jaw and the mastoid process.

On the neck and shoulders. — CERVICAL PLEXUS : along the margin of the trapezius from the occiput to the level of the fifth cervical vertebra. — Used in cervical neuralgia.

SPINAL ACCESSORY nerve : press the middle finger into the superior border of the trapezius at a point marking the first third of the space from the spinous processes to the outer margin of the acromion. — Used in myalgia of the trapezius, etc.

On the trunk. — DORSAL AND LUMBAR nerves : press the middle finger into the grooves between the transverse processes (fig. 57.) — For back-ache, etc.

INTERCOSTAL nerves : press the tips of all the fingers into the intercostal spaces from the angles of the ribs to their sternal extremities. — For intercostal neuralgia, asthma, etc.

BRACHIAL PLEXUS : steady the fingers on the shoulder (right hand for the left shoulder) and press the thumb on the first rib just back of the anterior curve of the clavicle. — Used in brachial neuralgia, writer cramp, etc.

PNEUMOGASTRIC: patient in Cr. reclin. pos, (fig. 55). Operator stands in front and presses the fingers of both hands into the epigastrium inward and upward while the patient is exhaling (Ask the patient to take a deep inhalation before pressing.) The fingers should be placed so that the tips form a flat surface (fig. 56.) and the hands should steady each other. This movement is spoken of as substernal pressure. — Used in flatulency, heartburn, etc.

The gastric branches can also be pressed by the fingers of both hands rolled in under the ribs in the left hypochondriac region. Care should be taken not to press on the apex of the heart. — Used in dyspepsia.

THIRD SACRAL, vesical branch: patient cr. reclin.

Operator in front; hands as for substernal pressure. Press above pubic crest into the pelvis and slightly upward, first at the median, then about an inch to each side. — Used in incontinentia urinae.

On the upper extremity. — MEDIAN nerve: press tips of fingers in the groove between the biceps and the triceps (taking care not to bruise the brachial artery) from axilla to internal condyle. For the INTERNAL CUTANEOUS nerve give the pressure a little farther back and for the ULNAR still nearer the triceps. The ulnar nerve can be followed from the inferior margin of the pronator teres to the annular ligament about three-fourths of an inch from the inner margin of the forearm; and the RADIAL can be followed from the outer margin of the biceps' tendon along the inner margin of the supinator longus about half way down the forearm (after that it passes *under* the radial artery and cannot be reached except through this vessel.) The MEDIAN nerve cannot be reached very well on the forearm on account of the thick covering of muscles; but it becomes superficial after passing under the annular ligament and can then be found at the middle of the first metacarpal bone by rolling the index finger around the margin of the abductor pollicies.

The CIRCUMFLEX nerve can be compressed by the index finger just below the insertion of the deltoid, also at

the posterior margin of this muscle half way between the latissimus tendon and the deltoid insertion.

On the lower extremity. — Anterior aspect. SECOND LUMBAR nerve, exernal cutaneous branch: press the index finger just below the anterior superior spine of the ılium in the groove between the sartorious and the tensor vaginæ femoris.

ANTERIOR CRURAL nerve (third and fourth lumbar): press the tips of the fingers from below the middle of poupart's ligament along the median of the inside of the thigh half way down (along the margin of the rectus femoris.) The INTERNAL SAPHENOUS branch can be conveniently reached in the fossa just above the inner cordyle of the femur between the sartorious and gracilis; then it can be followed from below the inner tuberosity along the ınner margin of the tibia to the annular ligament.

The ANTERIOR TIBIAL nerve can be followed along the outer margin of the tıbialıs anticus from the level of the tubercle of the tibia to the annular ligament.

Posterior aspect. The GREAT SCIATIC nerve: press the tıps of the fingers midway between the tuberosity of the ischium and the great trochanter and follow this line to below the margin of the gluteus maxımus, (fig. 58.) This groove, formed by the bıceps and great trochanter, ıs easily found by dividing the distance from the latter

point to the coccyx by three and pressing inward on the line marking the first division.

SMALL SCIATIC nerve: press the index finger along the margin of the gluteus maximus and turn a semi-circle into the middle of the thigh.

INTERNAL POPLITEAL nerve: Flex the knee. Press the middle finger into the popliteal space midway between the hamstrings and in direction of the centre of the patella.

57.

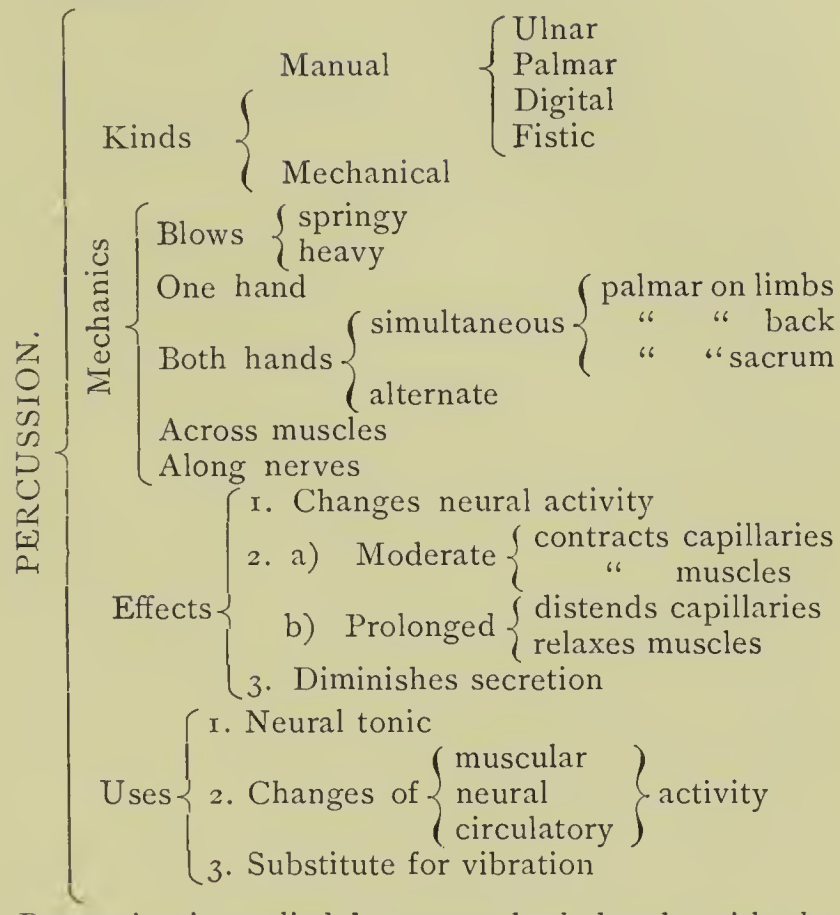
58.

POSTERIOR TIBIAL nerve: press the finger tips along a line curving from the centre of the popliteal space to behind the inner malleolus.

INTERNAL PLANTAR nerve: press the index finger just below the inner malleolus on a line from this bone to the angle of the heel. There is a corresponding point of pressure below the external malleolus for the musculo-cutaneous nerve. The internal plantar nerve can also be reached by the index finger just behind the ball of the foot on a line from the first interphalangeal space through the middle of the heel; and the EXTERNAL PLANTAR nerve can be pressed behind the ball of the foot on a line from the last interphalangeal space through the middle of the heel. This point is a little farther back than the one just mentioned.

Percussion. —

Synopsis :



Percussion is applied by one or both hands, with the ulnar border of the little finger ; with the palmar aspect of the fingers ; with the tips of the fingers ; or with the clenched fist ; for simultaneous or alternate blows. It may also be given by instruments known as "percussors" "percuteurs", etc.

The object of percussion being to produce a vibration

in the tissue submitted to it, the stroke should be quick and springy. The heavy blow is used by some operators to cause a slow nerve-vibration; but as it bruises the tissues and is unnecessarily painful, it is best substituted by intermittent pressure, and for that reason will not be described here.

Percussion is applied along nerves to change the vibration of their axis-cylinders in accordance with what has already been stated under "Movements of neurition in general." The same paths of movements are used as have just been described under "pressure".

Moderate percussion increases the irritability of nerves, and has proved an excellent means of arousing sluggish, sensory or motor nerves of neurasthenic and paretic invalids where other procedures have failed to produce any visible effects. On the other hand prolonged percussion leads to paralyzation, and may be used for nerves that cannot be reached by pressure, as for instance in trifacial, intercostal, and other neuralgias. It is to be remembered that, when percussion is applied for local purposes, it must be alternated by kneading in order to prevent soreness and inflammation of the superficial tissues, prolonged percussion causing vascular dilatation. It should also be borne in mind that percussion for sensory effect is applied from central to peripheral end, while for motor effect it is given in the

opposite direction, (see page 67.

Moderate and gentle ulnar percussion applied across muscles increases their contractility and is an excellent preparation for assistive and resistive movements when the muscles are loose and flabby, atrophied from non-usage or disease, etc. On the other hand, forcible and prolonged percussion on muscles and tendons will loosen these and so overcome contractions and retractions, as well as rigor from paralysis, over-usage, arthritis, etc. If both hands are used for percussion of muscles, the blows should be alternate, so that the wave produced by one hand may not be broken by that from the other. Besides the speed of vibration from the alternate strokes will be twice as great as from the simultaneous or from those of the single hand.

Moderate or gentle percussion causes contraction of the blood vessels; prolonged or forcible percussion causes their dilatation (Golz), so that the procedure becomes a means of removing or producing hyperæmia. In that manner percussion is used to drive the blood out of parts which cannot be conveniently reached by other procedures (head, heart, lungs, liver, pelvis, etc.), and also becomes valuable when it is desirable to flush a region as a means of enhancing the resorptive effects of kneading and circumduction (as in sprains, synovitis, etc. of long standing). When used for circulatory effects, percussion is applied with the palms for cutaneous vessels; with the ulnar border of the hands for deeper vessels; with the fingertips for vessels covered by thin lamellæ of bone; and with the clenched fist for vessels covered by heavy

muscles or thick bone.

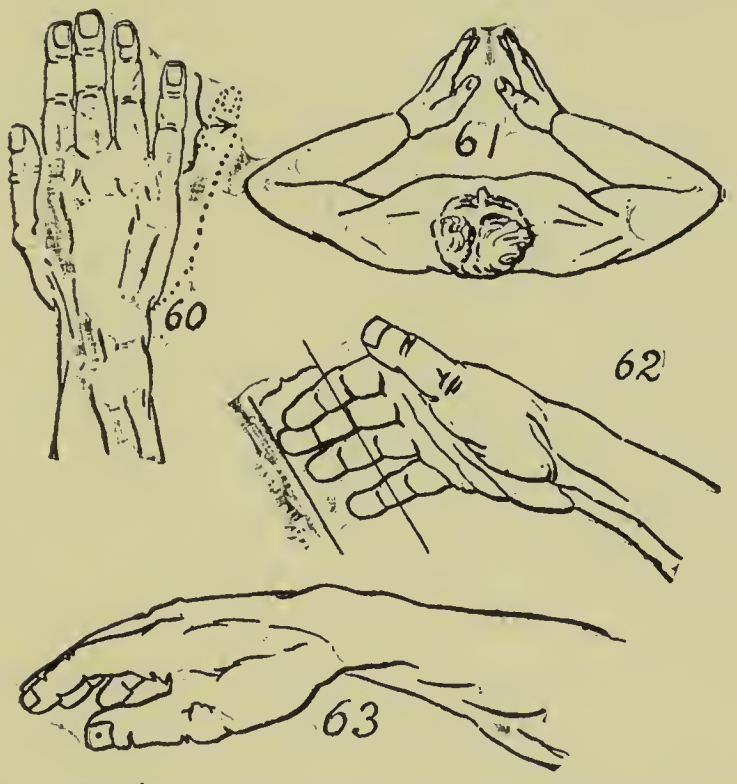
Through its effects upon the circulation, percussion secondarily increases absorption. Experiments also tend to prove that the procedure diminishes secretion in glands submitted to it. At least, it has been shown repeatedly that percussion of the liver lessens the excretion of bile into the intestines.

Percussion is sometimes used as a substitute for vibration, where small areas are to be put into motion and a strict localization is not called for.

Rubber-tipped mallets and rubber balls with elastic handles are convenient aids to produce light, highly elastic and well localized blows; especially if the procedure has to be continued for any length of time.

Back-percussion.— a) Ulnar (Fig. 59) Patient standing with hands on the back of a chair or other support:

back slightly bent forward and elbows somewhat flexed. Operator stands behind and applies a rapid hacking movement with the ulnar borders of his hands, one on each side of the spinous processes from above down (from the spines of the scapulæ to the sacrum). The blows in all



ulnar percussion are given by the last two phalanges of the little finger (fig. 60), the other fingers acting like a spring, being spread apart at the start, meeting and rebounding at the concussion. The stroke should not occur from the elbow, nor should it be a radio-ulnar flex-

ion, but should be the result of supination and pronation of the forearm. To that end the elbows are lifted and turned out and the wrists are extended (fig. 61). To move the hand from place to place (especially in back-percussion) it is more convenient to retain the relative positions of shoulder, elbow and hand, than to disturb the ultimate fulcrum, the shoulder, so that in back-percussion the operator's whole body moves down by bending the knees (from wlk. b. position).

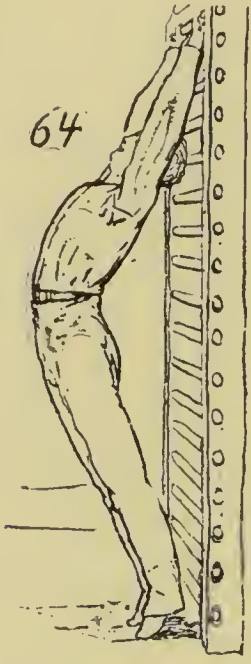
The blows should be as rapid as possible, and no part of the spine should be skipped; and the procedure should be repeated from above downward six to ten times. The patient may be lying down during the procedure, which then becomes less efficacious.—The movement produces vibration of the spinal cord and especially of the sensory nerve-roots; spinal vessels are also put into vibration; and the total effect is one of molecular revulsion in spinal veins and nerves, diminishing spinal congestion; causing nutritive changes in the cord; and relieving those conditions which prevail in nervous fatigue from spinal exhaustion. The procedure is a most efficacious neurotonic, useful in all cases of nervous depression where massage is indicated. Many operators, even, have become so convinced of its utility in a multitude of cases that they begin or end nearly all their prescriptions with this procedure.

When ulnar percussion is applied to the back for muscular effect the patient should be lying down in a position most favorable to relaxation of the muscles and the blows should be applied transversely from above down, or from below up, first on one side of the spine, then on the other.

b) PALMAR back-percussion : Position of patient and operator like the preceding. The blows are given by the palmar surface of the fingers (fig. 62) from perfectly loose wrist (fig. 63) oscillating in dorso-palmar extension and flexion. The strokes are alternate and otherwise resemble those of the ulnar percussion. The blows may be continued down on the glutei and should then be simultaneous below the waist-line. The procedure has less effect on the spinal nerves, more effect on cutaneous vessels and nerves, and resembles very much a cold shower, both in sensation and effect. The movement is more violent than the ulnar percussion, and hence less suitable for feeble invalids.

Chest percussion. — Patient takes str. gr. arch st. pos. (fig. 64) or in absence of apparatus shelter position (fig. 65). The operator stands in front and applies simultaneous palmar percussion to the back from the spines

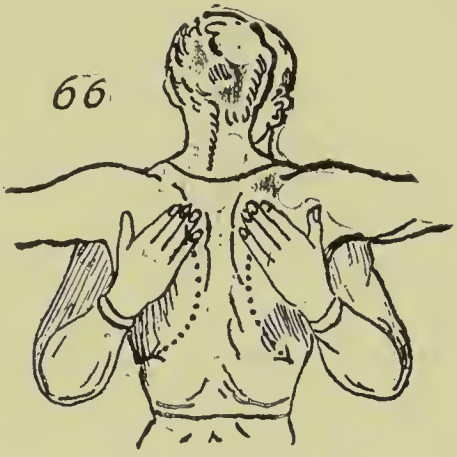
of the scapulæ downward outward as far as the end of the twelfth rib (fig. 66) and repeats this three or more times; then he gives alternate ulnar percussion to the



chest from the middle of the sternum obliquely upward, one hand on each side (arrows in fig. 65) and repeats this three or more times, when the procedure begins on the back again and is repeated in its entirety three to six times. The front percussion can be made alternate palmar instead of ulnar, the hands giving sliding blows upward outward. This form is gentler and more agreeable to the patient and consequently more suitable for very

weak patients. It is however much more difficult to apply.

The commencing position provides for tense muscles, so that the blows produce a vibration reaching through the chest-walls into the lungs. (The posterior muscles being very thick, it is necessary to give simultaneous blows behind in order to reach through them. In front



however the substratum is chiefly bony and each blow will take effect—here the simultaneous blows would offset each other.) The air-cells and their capillaries are put into oscillation so that a more perfect diffusion (of oxygen and carbon dioxide) sets in: the return current to the left auricle carries blood of a higher oxygen-tension. At the same time the motion produced in the walls of the

air-cells is an imitation (and exaggeration) of their normal function (expansion and recoil); the nutritive processes in the vesicular tissue are stimulated, increasing its tenacity and elasticity. Accumulations of mucus in the bronchial tubes become reabsorbed (this has been repeatedly proved in bronchitis), and respiration becomes deeper and easier. It is essential that the patient should not hold his breath while submitting to the procedure, as this would cause an over-distension of the air-cells. The movement has a wide range of usefulness in lung-diseases (and in conditions of lessened respiration from other causes), and especially in consumption (early stages), bronchitis, and emphysema.

Head-percussion. The patient is sitting with his hands on his knees. The operator stands in front and applies alternate ulnar percussion from the frontal suture to the lambdoid, and from the same beginning point radially outward (also on the forehead to the temporal bones). Next he places himself on the patient's left side, grasps the latter's forehead with his left hand and gives ulnar percussion with the right applied across the head and travelling in transverse spirals from the forehead backward and down along the trapezius on each side as far as the acromion. After this has been repeated three or more times, the operator again places himself in front of the patient and gives digital percussion from before back-

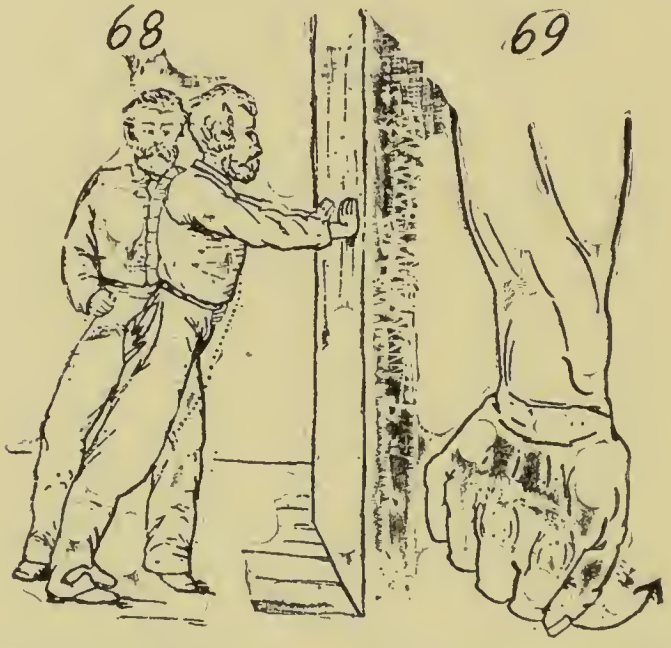
ward and radially to the sides, the hands moving alternately in palmo-dorsal flexion and extension, the tips of the five digits striking simultaneously and near together (fig. 67). The blows should be very light and springy.

The whole procedure is usually finished off by head-vibration (for which see below).—The cerebral vessels are put into vibration; the capillaries contract; the return current from the brain increases (much more than in head-circumduction, smaller vessels being involved); waste matter is carried off with greater rapidity, so that the recuperative processes in the brain can go on with increased power. The movement increases cerebral activity (attention), and gives a peculiar sensation of refreshment and invigoration. It is used in cerebral hyperæmia and is especially beneficial in nervous headaches, and in fatigue from brain work. Its uses in idiocy, lunacy, paraplegia and hemplegia are as yet in the experimental stages; and the average operator will do well to leave the head alone in the last-named two conditions.

Sacral percussion.—The patient stands facing the wall

(a chair, etc.) with his hands resting against it to steady the trunk. His feet are apart and the toes turned in, so as to steady the pelvis and make the glutei somewhat tense (fig. 68).

The operator stands on the patient's left side with his left hand around the patient's waist for support, and applies a series of blows with his fist on the gluteal region



from the base of the sacrum to the coccyx, and from the same point radially down the glutei (see arrows fig. 68). The hand is lightly closed and strikes elastic blows with the middle phalanges of the fingers, so that it closes more at the concussion, and immediately rebounds by partial extension of the first interphalangeal joint, the air inside

the hand acting like a cushion (the correct blow sounds "as if there were money in the hand", the incorrect blow sounds wooden and heavy). The blows should be quite gentle on the sacrum and gradually increase in power as the hand passes down the glutei; also, while the hand strikes at right angles to the surface above, below it should have a forward upward movement (arrow fig. 69)—The contents of the pelvis are put into vibration; the irritability of the nerves supplying viscera diminishes; pelvic veins and capillaries contract determining a more rapid return current; so that the tonicity of the pelvic contents will be heightened by a repeated application of the procedure. The movement becomes useful in all disorders where pelvic hyperæmia is a cause or a symptom: Diseases of women, disorders of digestion (constipation, hœmorrhoids, etc.), sexual neurasthenia, hypochondriasis, etc., chronic cystitis, etc.; and it is also found exceedingly beneficial for nervous invalids of a generally too high irritability—our experience seems to show that it acts upon the mind, the emotions, much like spanking on a naughty child: the reaction is soothing, all the more so because of the absence of all association of punishment. The procedure is a favorite with most masseurs and appears at the beginning or end of a majority of their prescriptions. (The percussion is sometimes applied with the patient lying down. But this is

much less effective, the relaxation of the glutei preventing the vibration from reaching through the bones. In this situation its usefulness is confined to sciatica and to contractures of the glutei.)

Liver-percussion.— The patient stands with his right hand on his head. The operator applies ulnar percussion with one hand over the floating ribs on the right side forward and backward in a transverse direction, the hand moving horizontally much like a cutting sword.

The movement has repeatedly produced a diminished secretion of bile; and for that reason has been prescribed in diarrhœa, jaundice, etc. The vibration produced in the liver would cause a contraction of its blood-vessels, and hasten the return current, so that the procedure should have some usefulness in hypertrophy of the liver and other disorders of a similar nature. There are, however, no records of the specific effects of this percussion in such cases, even though it has been used and has a scientific reason for existing.

Heart-percussion.— a) Palmar. The patient takes one-half str. gr. st. pos. with the left hand (compare Fig. 64). The operator stands on his right side, steadies him with the left hand applied in the middle of the back, and applies percussion with the right hand as follows: The whole arm is lifted, the flexed elbow leading, and the semi-closed hand hanging limp. When raised about

a foot, the arm is allowed to drop, the hand leading and striking with the ulnar part of the heel a rebounding blow in the middle of the chest; as the hand rebounds the fingers stretch and give a lingering, stinging, palmar blow toward the left shoulder, the hand gliding down obliquely towards the sternum as soon as the fingers touch (the skilled operator vibrates the hand in a dorso-palmar direction as it glides, so as to still better imitate the contraction of the auricles). The hand in its double stroke moves at right angles over the median of the heart, *i. e.* from the right obliquely upward to the left; and it slides back in the opposite direction. After the stroke of the fingers the arm is raised again for another double stroke, and these follow each other with a speed corresponding to the heart-beat; so that the rhythm of the percussion is the same as that of the heart when the procedure begins, and is then gradually lowered to about 72 a minute, and is kept at that rate for a while before the movement is stopped.

The movement introduces into the chest walls a rhythmical vibration which is gradually communicated to the heart itself whose contractions soon assume the same rhythm. For that reason it is necessary to give the percussion with a great deal of exactness; and it should be continued long enough to keep the heart-beat normal for some time after the procedure has ceased.

It may have to be continued for ten, fifteen, or more minutes, and the operator may have to change hands; but even then he must not change the rhythm, but the left hand should follow the right, or the right the left in uninterrupted succession. The heel-stroke should not be a push, nor a violent concussion, but a swinging, elastic drop with immediate recoil; and the finger-stroke, while stinging, should not leave the muscles sore. Altogether, the arm and hand describe a graceful double spiral; and the movement has to be seen to be understood, as no words or drawings could adequately describe it. It is used in functional and organic heart diseases to lower the pulse, and to assist the propelling power of the heart by adding mechanical stimulus to it. The movement can be given with the patient reclining, the operator sitting on his right side and facing him obliquely.

b) Ulnar. Both hands are used for alternate blows on the middle of the chest in a small circle from right to left (upward, across, downward, across). The speed of the blows is that common in ulnar percussion. The procedure can also be done so that the left hand moves up and down the sternum (to affect the aorta), while the right hand describes a circle over the ventricles and apex of the heart, the blows still being alternate. This movement is used in dilatation to cause a more powerful

ventricular systole, and to secure a better coronary circulation in a weakened or fatigued heart, where no organic changes have taken place. If used at all in valvular disease, it must be very moderate and gentle.

Percussion of the extremities. — a) PALMAR. The limb is supported so as to be relaxed (rest the foot on the seat of a chair; the hand on the back of the chair), and the hands strike simultaneous blows opposite each other one on each side of the limb, the blows to be rapid, springy, and usually travelling from above downward. This form of percussion is used as a finish off in general massage, especially when the massage is given in the morning or daytime, and the patient is not to sleep immediately after it. The effect is highly stimulating on cutaneous nerves and bloodvessels.

Palmar percussion on a small surface is given by one hand as a part of local massage, and may as such be applied anywhere after kneading.

b) ULNAR. The limb should be fully supported, or at least that part of it which is to be subjected to the procedure. The percussion is applied by both hands giving alternate blows across the muscles upward and downward, much after the fashion of chopping meat. It is used to harden loose and flabby muscles: to increase their contractility, and is then applied for short periods at a time, and should be alternated by gentle kneading.

When the procedure is prolonged, it loosens hardened muscles and tendons, and is as such applied to contractures, retractions, and tonic contractions, and may then be alternated by brisk, forcible, and prolonged kneading.

Ulnar percussion may be applied to finger tips and toes when they are numb, hyperæsthetic, or akinetic. It is done so that the finger (toe) to be subjected to the procedure is held in one hand between the thumb and index finger with only the tip projecting above, and the other hand gives the percussion on the tip, the strokes being very light and springy, and parallel with the nail. The movement has great usefulness in various forms of professional neuroses and other disturbances of the paralytic type.

The percussion on the toes is seldom used, but is substituted by percussion with a stick on the ball of the foot, the patient having his shoe on. Three feet of curtain pole, or a policeman's "billy," is the usual implement employed; and with this the operator strikes light and stinging transverse blows on the sole from the toes toward the hollow of the foot (the blows must not pass beyond the sole), while one hand holds the foot across the operator's lap (as in foot circumduction, except that the hand rests against the dorsal aspect of the foot instead of grasping around the ankle.) The procedure is an excellent means of warming cold feet and of stirring

up sluggish sensory nerves, and is used to advantage both in circulatory disturbances and in palsies.

Many modifications of the percussions described are used to suit different cases; but such variations will hardly need description, any skilled operator soon becoming his own best authority in the matter.

Before leaving percussion we would impress it upon the masseur, that this procedure often will do so much more than kneading, that it is well worth the extra exertion for the results obtained. The masseur can never afford to let his personal strength or convenience regulate his choice of movements.

Vibration. —

Synopsis :

- VIBRATION.
  - Kinds
    - Regional
      - tremor
      - shaking
    - Vibratory pressure
  - Mechanics
    - Hands form pivot
    - Longitudinal
      - nerve
      - limb
    - Transverse
      - abdomen
      - liver
  - Effects
    - Molecular revulsion : exchange of tissues
    - Increased mobility
    - Changed neurition
    - Increased venous circulation
  - Uses
    - Stimulant in palsies
    - Counterirritant
    - Resorptive
    - Substitute for percussion

After what has already been said about movements of neurition in general, the above synopsis (Page 95) sufficiently explains the characteristics of vibration without any need of our entering upon a lengthy discussion ; all the more since details will be furnished in the descriptions of special vibrations. Therefore we will enter immediately upon the consideration of these.

Yd. c sitt. A. vibr.— The patient is sitting with one arm extended sideways, the other hand grasping the side of the chair. With both hands the operator grasps the patient's arm just above the wrist (do not pinch, nor squeeze), and vibrates it while gently stretching it. The operator's arms are bent to about 90 °, and the vibration occurs by his fixing his shoulders and arms and producing a rapid tremor in the hands, which becomes transmitted into the patient's arm, and even into the neck and other shoulder, until finally the wave at the shoulder is larger than that at the hand; so that in reality the operator's hands form a kind of movable pivot for the movement. The first stroke resembles a whip-motion, a longitudinal wave being thrown into the arm; and while there is merely a tremor at the hand, the wave at the shoulder should be quite forcible. The operator should be well braced (best in stride pos.), and will find it easier to give the movement if he bends the body somewhat forward. Fatigue sets in very quickly, and it becomes neces-

sary to stop and rest after comparatively few vibrations, before continuing the movement. In this way interspersed with pauses, it is applied for two or more minutes.

The movement sets up a molecular revulsion throughout all the tissues of the arm, emphasizing the phenomena of osmosis and diffusion, hastening circulation and reabsorption, and it stimulates all the nerves of the limb, especially the larger trunks, making it a useful procedure in hemiplegia. The tissues of the shoulder-joint are put into motion much after the type of their inherent molecular vibrations; an interchange of molecules sets in, with loosening of hardened and hypertrophic ligaments and tendons, and of rheumatoid adhesions, so that the movement will be indicated in cases of arthritis and periarthritis. The vibration is communicated into the apex of the lung and affects this organ as would percussion (see chest-percussion), but has none of the severity and bruising effects of the last-named procedure. For that reason in phthisis, etc., with tender superficial tissues, this procedure is to be preferred.

1-2 *Str. reclin. A. vibr.*—The patient reclines with one arm extended upward; the operator stands behind, grasps the arm with both hands around the wrist, stretches it gently and vibrates as just described. In this situation the effect is less in the arm, more in the chest; the pectorals, teretes, serratus anticus, lat. dorsi., etc., are stretched

and vibrated; and it will be found that repeated application of the procedure will permanently make these muscles more extensible and pliable, so that the possibility of pectoral respiration highly increases. The whole upper lobe of the lung is thrown into vibration, so that for pulmonary effect the procedure is much more far-reaching than the one just described. The movement is indicated in hemiplegia, where the axillary tendons are in a high state of contracture; in professional (writer's, etc.) palsies extending into the thoracic branches of the brachial plexus; and in pulmonary disorders. The peculiar sense of rest and relief produced by the vibratory extension of muscles and blood-vessels, and the direct effect upon the circulation of the shoulder region makes this movement very useful in heart-diseases, where the active raising of the arm above horizontal has become a thing of the past (on account of its forcible effect of increasing the arterial pressure). The movement is also useful as a means of stretching the concave side of a dorsal curvature.

Str. reclin. 2 *A vibr.*—Grasp and pos. as in fig. 47. The vibration is done in the manner already described. The tension in the pectorals is much more severe; and the vibration will be localized chiefly to the middle-anterior chest, the upper portions of the pectorals being relaxed, and the clavicular chest somewhat compressed. The more the trunk inclines backward, the more the ab-

domen will be brought into the movement; so that in this situation the latter will be useful chiefly for dyspeptic invalids of diminished respiratory vigor, and for weaklings with fore-shortened thorax.

As the arms are being stretched upward the vertebræ (through the mediation of the trapezii) become drawn apart—an effect which becomes emphasized if the trunk is erect or inclined forward—and the vertebral veins are put into vibratory extension. The ensuing increased diffusion in these vessels will hasten the removal of waste matter from the cord and spinal nerves, in a manner resembling the effects of kneading and percussion, except that deeper vessels are reached, and that there is none of the jarring of the cord, nerves, and spinal muscles consequent upon percussion, so that the movement becomes a gentle, effective, and agreeable means of removing nervous fatigue due to spinal congestion.

Hand vibr.—The supporting hand grasps as for hand circ. (fig. 45.) ; the other hand holds the patient's open hand with the thumb crossing the dorsal aspect of the metacarpo-phalangeal articulations, the fingers in the palm of the hand (do not squeeze). Vibrate the hand in a radio-ulnar direction, confining the motion to the wrist joint. Useful in rheumatic gout, sprains, etc.

Finger vibr.—Grasp as for finger circ. (fig. 44) and vibrate the finger from the metacarpo-phalangeal articu-

lation in a transverse direction. Indicated in stiff joints from arthritis, contracture of the palmar aponeurosis, etc.

Cr. b reclin. L vibr.—Patient reclines (fig. 8.); operator stands facing him and grasps his extended leg with both hands just above the ankle and gives a vibration like that described for the arm (see yd. *c* A vibr.), the wave extending beyond the hip into the pelvis and abdomen. The more the trunk inclines backward, *i. e.*, the straighter the hip-joint becomes, the higher the waves will reach into the abdomen; so that for pelvic effect the hip should be semi-flexed; while for effect on the hip-joint it should be flexed to 90 ° or more; and for abdominal effect extended. The effects on the leg are increased reabsorption and innervation, and increased mobility of the hip-joint. When the pelvis and abdomen are brought into the motion, the vessels and nerves of these regions become affected as in (2) hip circ. (see pages 45 & 50), except that smaller vessels are brought into play, and that viscera and their nerves are more directly acted upon. The movement has proved useful in pelvic congestion with consequent obstruction of menstrual passages and general atonicity of carrying ligaments, and other organs; and it can be endured far better than hip-circ., external or internal massage, or similar procedures. Like all vibrations of large regions it produces a sensation of local rest and general relief, and will for that

reason prove of great value in the medico-gymnastic treatment of gynæcological cases. It has also given good results in constipation and hæmorrhoids, where for some reason abdominal massage and sacral percussion could not very well be applied.

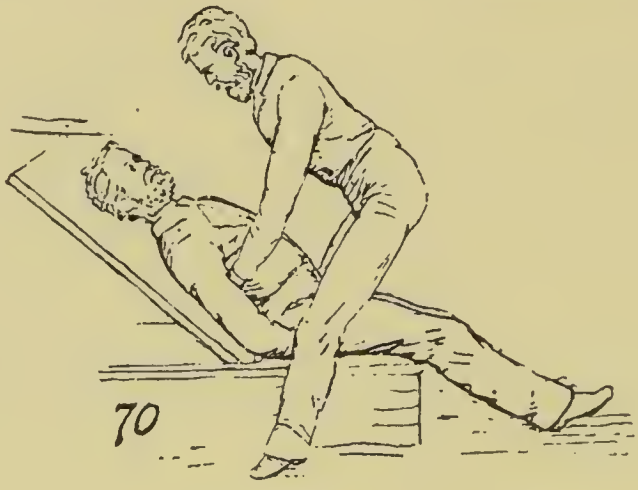
Cr. a L vibr.—Patient in reclin., sitt., or better still, 1-2 sitt. pos. (fig. 14). Operator stands to one side, rests one hand (right for the left side) on the patient's thigh, grasps the patient's foot with the other hand, the palm against the hollow of the foot, thumb on the inside, and vibrates this leg at the knee-joint, taking care to keep the thigh steady. The movement is used to loosen adhesions, and to adjust menisci, displaced by arthritis, etc., and is then best combined with a gentle rotation (usually rotation inward), occurring during the vibration. It reaches the interior of the joint and has practically no effect whatever on the circulation and innervation of the leg or thigh.

Foot vibr.—The grasp is similar to that of foot circ. (fig. 42), and the movement resembles hand vibr., except that it is much more restricted, the ankle being a saddle-joint, while the wrist is condyloid.

The toes may be vibrated as the fingers; and this movement as well as the foot vibr. may have some usefulness in arthritis and gout, although kneading and percussion probably will accomplish more in a shorter time

without being enough more violent to warrant the substitution. The vibration of feet or toes should be used only when the other procedures have proved ineffective.

Reclin. T. vibr.—The patient is reclining with the trunk nearly horizontal. The operator stands on the patient's right side (or astride him), close to and facing him, grasps the patient under the back with the fingers of his two hands meeting just below the shoulder-



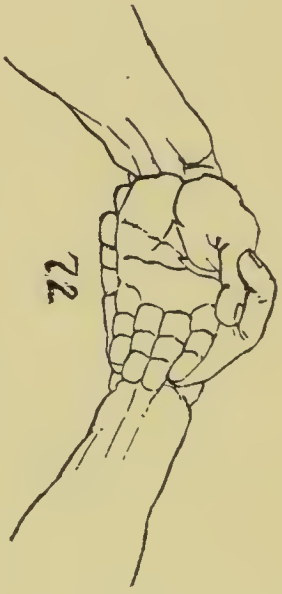
blades (fig. 70), and while gently arching the patient's spine by lifting with both arms, he vibrates the thorax with a fine tremulous motion reaching from spine to sternum. Gently he lets the patient down again, pauses a moment and repeats the procedure (including the pause) five to eight times. This movement resembles chest percussion (see page 83) in its effects, but

is far gentler, and therefore can be more easily endured by weak patients. It differs somewhat in mechanical effect, since in chest-percussion the waves move both from the sternum and from the spine, while here the direct waves go only from the spine, so that in T. vibr. it will be chiefly the posterior portions of the lungs that will become affected. On the other hand, in chest percussion the vibration produced is largely local, confined to the substratum of the stroke at the time of the concussion, while in T. vibr. the whole lung is vibrating at once, or at least in a succession and with a continuity more like those caused by respiration. So that T. vibr. has a greater effect of stimulating the respiratory act, while chest percussion is more a local application to individual air-cells. T. vibr. also produces a vibration in the heart and aorta, driving the blood onward into the arterial system, and hence is useful in organic heart-diseases, especially when heart percussion cannot be endured. In that way, while one movement may substitute the other, each has its own sphere of usefulness.

Str. gr. st. T. vibr.—The patient takes str. gr. st. pos. (fig. 71) at the stall-bars or other convenient apparatus. The operator stands facing him; braces one foot against the bars; and, with hands locked or overlapping (fig. 72) on the patient's back just below the shoulder-blades, he vibrates the patient's thorax, while drawing him for-

ward until his heels are off the floor. He lets him sink back and repeats the procedure six to ten times. The pressure by the hands in the back should have a forward upward direction, and should be slow and steady. The movement may conveniently be combined with respira-

71



72

tion, inhalation occurring while the body is being arched ; exhalation, while it recedes towards the apparatus. By the tension in the pectorals a strong thoracic aspiration is produced. The superior chest and the vascular capacity of the arms increase at the same time, so that

while a greater quantity of blood is passing into the thorax, yet there will be no undue increase of pressure in the heart and large vessels: the general circulation is hastened without increase of heart-beat. The chest expanding and the air cells filling, the vascular surface in the lungs increases; and as at the same time the air-cells (especially of the apices) and their capillaries are thrown into rapid vibrations, a more perfect osmosis will ensue: a more perfect exchange of gases takes place between the pulmonary air and the blood. The elasticity of the air cells will increase, partly owing to the molecular revulsion set up in their walls, partly owing to their more perfect expansion by the in-rushing air whose penetrating energy has become vastly increased by the vibration. The motion produced in the bronchi and their minute ramifications causes a diminution of their mucus secretion, or rather, causes reabsorption of superfluous or accumulated mucus (this is a known fact, whose theoretical reason has not yet been found). The movement then has a large field of utility: It may be applied for its general effects upon the circulation as a strong respiratory exercise of the passive type; as a means of providing better oxygenation of tissue in emaciated individuals, and in cases where the metabolism is not rapid enough to secure a proper assimilation of ingesta; in cases of pelvic congestion, where "internal elevation"

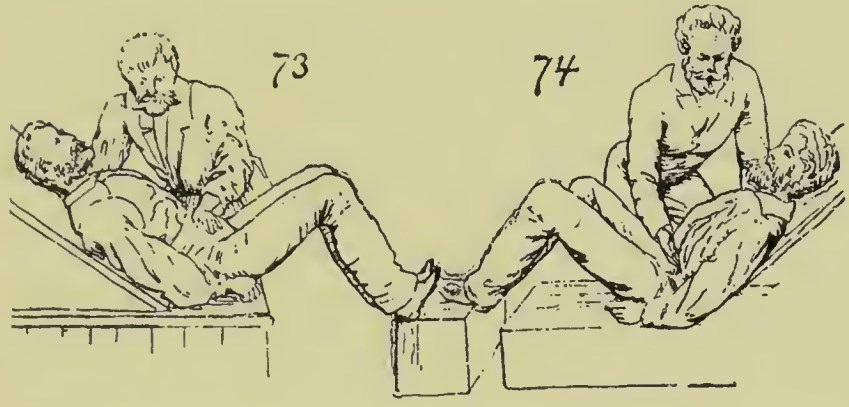
is indicated; in foreshortening of the thorax and abdomen, due to pectoral rigidity; and in cases of pulmonary disease located in air-cells or bronchial tubes.

This movement is not used as a substitute for chest percussion, but is often applied as a finish to it. It is contra-indicated in organic heart-diseases, owing to the effects of the commencing position: expansion of aorta and ventricles.

Sitt. Heart-Vibr.— Patient sitting (fig. 10). Operator stands on his right side, places his right hand in the middle of the patient's chest and his left in the middle of his back, the fingers of both hands pointing vertically down. Pressing his hands firmly towards each other he produces a tremor inward from spine and sternum. The pressure should be moderate and the vibration should have the shortest possible wave.—The movement, in its effects, resembles ulnar heart percussion (see above), but is milder and leaves no soreness in the superficial chest muscles. It is used in dilatation of the ventricles with atrophy of the walls.

Cr. Reclin. abdomen-vibr.— The patient reclines with knees drawn up and feet supported so as to relax the abdominal muscles. The operator stands to one side and applies his nearest hand across the patients abdomen, the hand being arched so as not to press on the umbilicus (fig. 73). Without sliding on the skin he gives a rapid

to-and-fro movement (like sawing) letting the pressure from the hand gradually change from the radial to the ulnar border and back again, so as not to give a continuous pressure on any one part of the abdomen. Inter-



spersed with brief pauses, the movement is continued for two or three minutes, the pauses being conveniently filled by gentle kneading. The movement superinduces peristalsis: It is a counter-irritant in diarrhœa.

Vibration of the abdomen is also given in the form of a gentle dorso-palmar tremor by one hand moving from place to place. In this form the vibration is an auxiliary to kneading, inducing peristalsis, and assisting in loosening hardened fæces, etc. It has also been found to afford great relief in flatulency and atonic dyspepsia.

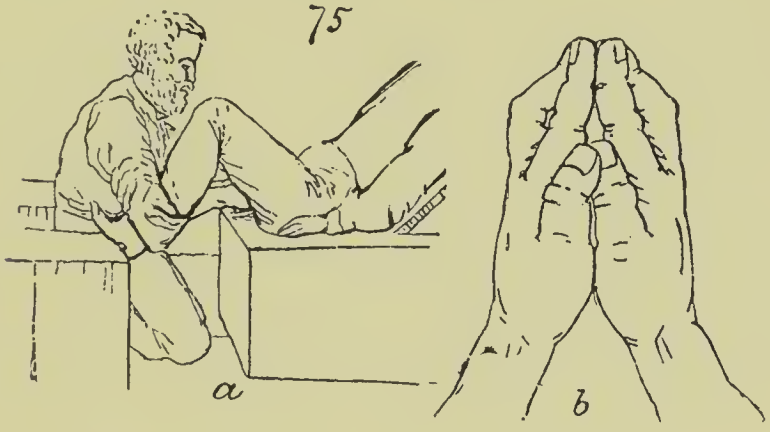
Colon-vibration.— Patient in sit-reclin. pos. (compare figs. 2 and 8); operator stands facing him, and slides his right hand along the descending colon (from

above downwards while vibrating it in a palmo-dorsal direction, the cushions of the fingers giving a slight pressure while gliding. A similar movement may be done upward on the right side, and also across the abdomen ; and the skilled operator may even begin in the right iliac fossa and follow the course of the colon to the sigmoid flexure with one continuous vibration. The movement is very useful in constipation and will prove even more efficacious than the kneading with the tips of the fingers.

Left Hypochondriac vibration.—Patient in cr. *a* reclin. pos., operator stands to one side and applies his hand edge-wise below the patient's left ribs (fig. 74). He rolls his fingers in under the ribs, and, pressing upward, he performs a tremulous vibration putting the stomach into motion. The movement may done with both hands, the operator standing on the patient's left side and slightly back of him. A molecular revulsion is set up in the gastric branches of the n. vagus, and in the gastric and peptic glands, causing a livlier secretion and inducing peristalsis. The movement has proved useful in atonic dyspepsia, in gastralgia, etc., and, when used, is best applied as a preliminary to kneading. Care should be taken not to press the fingers against the diaphragm (middle leaflet), as that may upset the heart's action. For quite the same reason the movement is contradicated in heart-diseases.

Sub-sternal vibration.—Position of patient and operator as in sub-sternal pressure (See page 72 ; fig. 55). The fingers of both hands give an inward, upward pressure (fig 56) combined with vibration. The effect is changed neurition in the pneumogastric, and the movement is indicated in flatulency, gastralgia, heart-burn, etc.

Bladder–vibration.—Position as in suprapubic pressure (page 72). The hands press inward upward while vibrating. The movement is indicated in chronic cystitis, and in paralysis of the detrusor.



Perineum-vibr.—The patient reclines with feet drawn up, separated and supported (fig. 75a. : cr. a stride reclin. pos.). The operator sits in front, presses the fingers of both hands (as in substernal pressure, fig 75b) between the descending rami of the pubes and performs a sag-

ittal vibration. The movement is alternated by kneading of the same region and by transverse percussion of the inside of the thigh. It has proved useful in enlargement of the prostrate, in prolapsus ani, and in lacerated perineum.

Head-vibr.—The patient sits erect; the operator stands in front and applies one hand on each side of the patient's head, the fingers just below the occiput, the heels on the cheeks, and the hands arched so as not to press on the ears. Lifting the head so as to make the neck tense (the lifting is done chiefly by the fingers), he puts it into gentle vibration; pauses a moment, while relaxing; vibrates again, etc.—All the blood-vessels of the brain are brought into motion: a temporary increase of cerebral pressure sets in, which is soon followed by its diminution, the vessels contracting (owing to vaso-motor reflex), and the blood being driven into the distended vessels of the neck—the jugulars and tributaries become stretched, *i. e.* distended, by the lifting of the head—so that the movement becomes a means of rapidly relieving congestion of the brain. It surpasses percussion in general effect on the brain and cerebral vessels, and may be given when percussion cannot be endured. No other movement affords such a sense of rest and recuperation in nervous headache and mental fatigue as a well applied vibration. On the other hand

the local effect on the cortex is greater from percussion, the vibration more especially affecting the ganglia at the base of the brain. Head-vibr. is usually applied as a finish to head percussion and head circ.

Ear-vibr.— The patient sits erect ; the operator stands facing him and grasps his ears between the fingers and heels of the hands ; and, while slightly pulling the ears upward outward, he produces a tremor which becomes transmitted into the ears—possibly reaching the tympanum and ossicles. The movement is recommended for deafness (Hartelius), but is of doubtful, or at least non-proven value.

Nose-vibr.—The patient takes stoop sitt. pos. (fig. 11). The operator stands on the patient's right side, applies his left hand between the patient's shoulders and with his right grasps the nasion (fig. 76) so that the middle phalanx of the index finger rests against the frontal bone, the third phalanx along the nose, and the thumb and middle finger against the sides of the nose (without pinching). While gently (but quite rapidly) pushing the patient into erect attitude, he vibrates with his right hand so that the tremor goes through the index finger into the frontal bone, the wave being sagittal instead of transverse. Then he pushes the patient forward into stoop pos. and repeats the procedure three or more times, the vibration occurring while the patient rises. The move-

ment causes absorption of mucus in the nasal passages and has proved useful in catarrh. The backward motion of the trunk causes an increase of blood-pressure in the head (by centrifugal force), and thus improves the effect of the vibration.

Larynx-vibr. The patient stands or sits. The operator stands to one side and applies his hand on the patient's larynx, the thumb on one side, the fingers on the other (grasp back of the cricoid cartilage and slide the hand forward to the middle of it. This will prevent gagging.); and without squeezing he gives a transverse vibration (tremor), his fingers touching the throat merely enough to communicate the motion. The movement is alternated by kneading. The effect is increased absorption and changed neurition, and the procedure has proved efficacious in catarrh of the throat, sore throat,

colds, paralysis of the vocal cords, etc.

A similar movement may be applied to the pharynx.

Jaw-vibr. The patient sits with open mouth : the operator stands in front and puts both hands under the patient's jaw, fingers crossing, thumbs resting on the canine teeth and the heels of the hands pressing against each other. The jaw is now given a minute upward-downward, or forward-backward vibration alternated with resistive closing of the mouth. The movement is useful in odontalgia, and in periarthritis of the temporo maxillary articulation.

Scalp-vibr. (Fig. 77.) The patient sits or reclines. The operator vibrates the scalp by a rapid to-and-fro movement of the fingers of one hand, only the cushions of the fingers being in contact with the head and pressed firmly against it so as not to glide on the hair. The movement is rectilinear from index-finger to little finger and back (it is not dorso-palmar). The hand is moved from place to place over the head so that all the scalp may be exercised, and the other hand meanwhile steadies the head for better localization of effect. The movement causes molecular revulsion in the hair-roots, etc., increasing the nutritive phenomena, and it has proved valuable in baldness, both as a preventive and a cure.

Face-vibr. The muscles and tissues of the face are vibrated by the fingers of one hand (as in scalp vibr.)

while the other hand steadies the head (or the head rests against the back of a chair, etc.). The movement is usually applied from the lobule of the ear radially toward the forehead, cheek, and jaw (following the ramifications of the facial nerve). It is used in facial paralysis, neuralgia, etc.

Vibration may be applied in connection with other passive movements, *i. e.*, extension and rotation, or with these two combined. This is done so that the operator steadies the proximal side of the articulation with one hand, grasps the limb with the other hand near the next joint, and gives a vibration while extending or rotating the limb at the fixed articulation. This procedure is especially useful for stiff joints after fracture, dislocation, sprain; in arthritis, periarthritis, etc.

It loosens adhesions, stretches contracted tendons, and replaces interarticular cartilages into juxta–position more quickly than any other procedure. It is an invaluable adjunct to massage in traumatic cases.

Vibration is a most tiresome operation for the masseur, and to save his work numerous machines have been invented to substitute the hand. Of these, Dr. G.

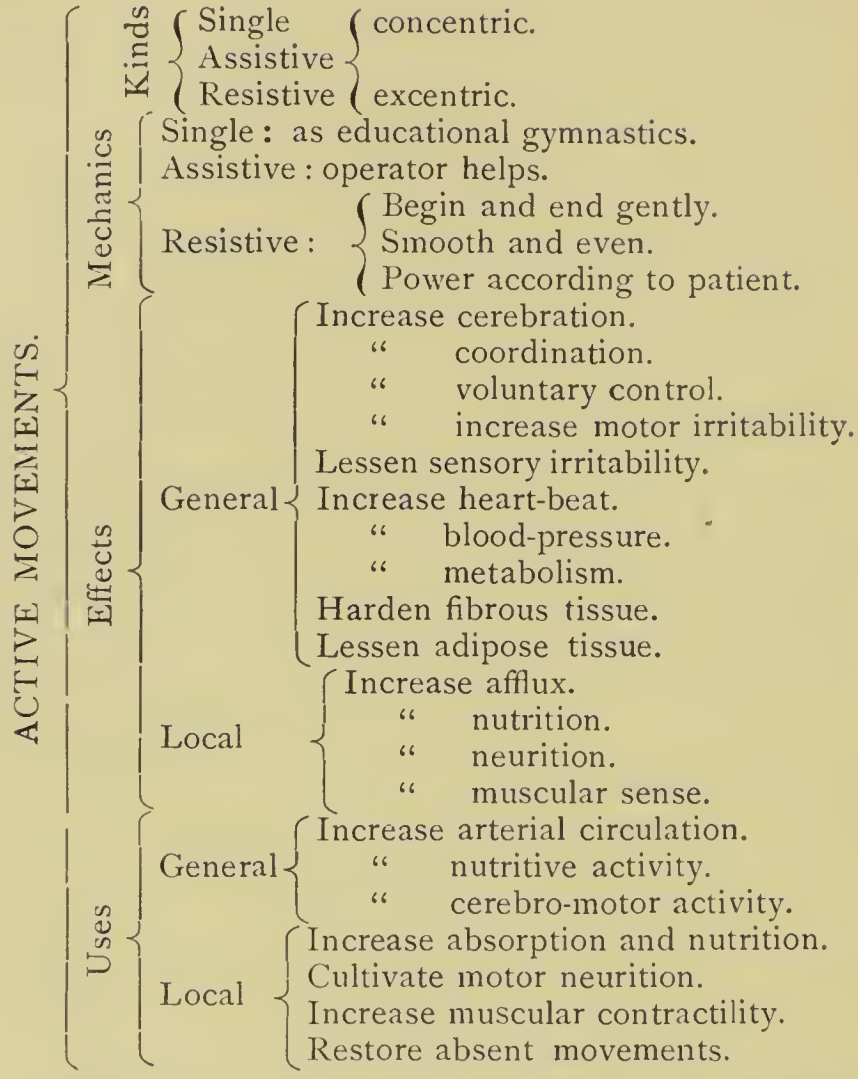
Zander's machines for general vibrations, and Dir. H. Liedbeck's "Vibrator" for local applications are the best.

It should be said for the machine-vibration, that it can be given for any length of time with the highest degree of exactness; and that for this reason it is superior to the manual procedure, where vibration has to be used extensively as a special application. For ordinary purposes, however, the manual vibration is sufficiently exact.

Vibration imitates the most nearly the bioplastic movements, and in that manner becomes the most natural procedure. In the technique of massage, it forms one of the "finishing touches," and the wonderful success of some operators in delicate cases is oftentimes due to their skill in the use of vibration. We recommend the movement as one of the jewels of medical gymnastics.

Active movements.—

Synopsis:



A movement is active when executed by the patient himself; if he does it alone it is called single; if the

operator helps him in performing it, it becomes assistive; if one, or the other, or a machine offers resistance, resistive. If the action is that of giving up to the weight (as when a patient resists the stretching of his limb by the operator), the movement is called excentric, *i. e.*, the active muscle lengthens; if the action is that of overcoming the weight (or resistance), it is called concentric, *i. e.*, the active muscle shortens. These movements are so related in progression that the assistive precede the others for reasons plain to every one; and for a majority of cases the resistive precede the single, for the reason that in resistive movements the launching effort is partly reflex, caused by the contact of the apparatus or the operator's hand; so that the single movement really requires greater cerebral impulse—is more difficult from a neurological point of view.

The single movements are all borrowed from educational gymnastics and will need no description here, since every masseur should be familiar with that branch before entering the domain of medical gymnastics. Likewise, assistive movements will need no description, suffice it to say that these substitute the others when the voluntary nerve-impulse is deficient and has to be gradually restored. The resistive movements form the chief bulk of medical gymnastics, and their most common types will be described below. To take up all would be im-

possible since there are thousands of commencing positions, and there are many useful movements possible in any one of them. Before going into details it might be well to mention some general facts about active exercises.

Active* movements begin and end in the brain, so that their first effect will be increase of mental activity with consequent greater afflux to the active centres. The constant use of motor nerves will increase the irritability of these and it will be found that sensory nerves meanwhile become less impressionable. For that reason, active movements are most decidedly indicated for "nervous" invalids who are not weak enough for massage, —N. B. No one is too *weak* for massage, even though we often hear it said, "Oh, he is not yet strong enough for massage."—and whose neurasthenia is not of spinal origin. Active movements presuppose attention, will, and co-ordination, and consequently develop these, while passive movements favor inattention, relaxation. Active exercises also produce a consciousness of power, that *ability to do* (the aggregate of muscular sense), which in so many cases is a long step toward a cure, and which cannot be gotten by purely passive movements. While this holds good as a general effect, it is equally true that similar effects can be produced locally, *i. e.*, increased motor connection and heightened muscular sense in any

*In this treatise we do not deal with reflex and automatic movements as these have no place in gymnastics.

part will set in by localizing the exercises to that part.

Active movements increase the heart-beat by increasing the arterial resistance; secondarily, the arterial currents are hastened, their *vis-a-tergo* being increased. The general nutritive activity is heightened, since nutritive material is carried more quickly to the tissues, also because the increased pressure causes increase of osmotic phenomena. Assimilation and elimination increase so that the general metabolism is much heightened, raising the standard of general bodily health and strength.

Locally active movements cause an increased afflux to the parts put into motion, and there will be a consequent increase of local nutritive activity: growth of muscle and bone is encouraged, and even the fibrils of the active nerve increase in number and size. The active movements, then, become a means of developing under-sized, atrophied, and paretic muscles, and of bringing them under control of the will, in this respect far surpassing the passive movements, since these do not increase muscular contractility or motor neurition. It might be said that passive movements stimulate the vegetative functions while the active ones promote the animal ones—develop in the individual the active power of being, *i. e.*, of doing. The passive movements merely produce and maintain the power of existing, and so are in reality mere stepping-stones to higher ends, a means

of tiding the weakling over, and preparing him for a more normal type of activity.

Active movements, then, must be the final aim in medical gymnastics; and massage is to be considered merely as an introductory measure, and as an auxiliary, when the subject is considered as whole. This, of course, does not lessen the merit of massage as a specific application in a great many diseases, where in the nature of things active movements would be contra-indicated.

Of the comparative effects of active exercises it might be said that those of single movements are the same as of educational gymnastics; that resistive movements have these effects in a higher degree more localized, less generalized, especially as regards the action of the brain as a unit; and that assistive movements form a transition from the passive exercises to the active, having effects stronger than the first (effects of a different neural type) and very much milder than the last.

Active medico-gymnastic movements have as many uses as educational gymnastics and many more, since they are chosen for educational effects of a much more delicate nature: to lift the individual from a state of ill-health into normal power, to lead tissue-action into normal paths, normal habits, not only as in educational gymnastics, to encourage and increase the good health already present. To elaborate on the details of their

uses will not be necessary, the preceding synopsis furnishing sufficient information on this point.

As will be seen later, the choice, progression and interarrangement of medico-gymnastic exercises are based on pathological considerations rather than as the educational on phyiological ones; yet through the realm of medical gymnastics there should be a strong influence of educational principle to guide and restrain the operator: he should remember that a patient is not merely an "interesting case" for study and experiment, but an individual with just claims to a place of his own in the world and with work of his own to do, and that medical gymnastics exists only as a means to help the patient reach the fulness of his power more quickly, and not as means of enjoyment to the masseur.—We have thought this advice timely, since many masseurs act as if they held the opposite view.

The resistive movements are usually done so that the patient executes the movement while the operator resists, but may in special cases be reversed, the patient offering resistance (giving up to the power) to the operator's movement. This form can be used earlier than the first-named one, and is especially useful in cases of motor paralysis, where the voluntary power is just returning. In the movements described below, the patient executes, the operator resists, unless otherwise ordered.

To indicate the reverse the abbreviation exc. (excentric) is added to the name of the movement.

The resistance offered should be slight at the beginning and end of the movement, since the muscles have the poorest levers at these points. Toward the middle of the movement the lever grows longer, and the resistance should increase proportionately. It is customary also to begin and end each movement with passive extension (or compression), it being found that a muscle contracts more readily, if it is stretched first. This is due to the fact that the recoil then assists the contraction, so that, in reality, the beginning of the latter is passive. Besides, passive extension has the effect of hastening the venous current, and in that manner, the fatigue products being carried away more quickly, the endurance in the muscle increases, *i. e.*, the resistive movement so prepared will give all the beneficial results and hardly any of the effects of fatigue. The muscles may also be prepared for contraction by massage, since this has been found to more than double their power of endurance. In any case the resistance offered should be modified according to the patient's strength, so that the movement becomes smooth, even, and free from tremor, pushes, or starts. The grasp should be light and easy, so as not to pinch or squeeze the patient, and yet it should be firm and steady.

The active movements can be classified like those of educational gymnastics into arch-flexions, lateral trunk-movements, etc.,—it is a fact that the Swedish "bill of fare" of exercises was used first in medical gymnastics—but for convenience of description in the following syllabus they will be grouped by names. There is, however, one group of exercises, the respiratory, which needs to be considered by itself, and for that reason we will describe it before the others.

Respiratory Exercises : —

SYNOPSIS :

Respiratory Exercises.

- Kinds :
  - Assistive.
  - Single.
  - Resistive.
- Mechanics :
  - Respiration plus
  - special chest-expansion.
- Species :
  - wg. / rest } sitt. shoulder circ.
  - reclin. 2 A elev.
  - Str. reclin. 2 A flex.
  - reach ly 2 A elev.
  - wg. st. 2 Heel elev. w. chest exp.
  - Str. gr. st. chest exp.
  - St. 2 A elev. w. chest perc.
- Effects :
  - Thoracic aspiration.
  - Quickened { venous / lymphatic } circulation.
  - Diminished blood-pressure.
  - Diminished right ventricular systole.
  - Increased oxygenation of the blood.
  - Increased elimination.
- Uses :
  - For general effects on venous circul. } at { end / beginning / middle } of treatment.
  - For special effects on { *a*, portal circulation. / *b*, heart-beat. / *c*, aircells.

The respiratory exercises consist in deep respiration accompanied by some movement that will emphasize the expansion and relaxation of the chest. The movement may be done by the patient himself, as in the ordinary respiratory exercises borrowed from educational gymnastics; or an operator expands the patient's chest, as in the assistive resp. exer., the common type used in medical gymnastics; or the operator may expand the patient's chest under resistance, the patient meanwhile making the effort of inhalation, a type used for muscularly strong patients who need an exaggeration of the effects of thoracic aspiration and internal elevation.

As the chest expands for inhalation, viscera become drawn toward the chest, and the blood is drawn forward in the venæ cavæ; also, the vascular surface in the lungs increasing, the blood is drawn from the right heart toward the vesicular capillaries. A general diminution of the pressure in the veins ensues, and the contraction of the right ventricle lessens, the blood passing onward mechanically as if affected by a force pump, the expansion of the chest representing the rising of the piston. At exhalation the reverse phenomena occur, there being a retardation of the venous currents and a slight acceleration of the arterial ones. By making the inhalation comparatively rapid, its effects may be heightened; and by making the exhalation slow, its effect of retardation

can be reduced to a minimum; so that the total effect of the respiratory movement will be diminution of blood-pressure and acceleration of the venous circulation. By making the chest-expansion assistive the negative pressure (suction) in the vena cava becomes five to six times as great as it is during ordinary respiration*; and it follows that the other effects of the movement are proportionately increased, making the movement of the greatest value in all disorders dependent on or accompanied by retarded venous circulation. The suction in the inf. vena cava will especially empty the hepatic veins, which are its nearest afferent vessels, and consequently hasten the flow through the liver, so that the respiratory exercises become very useful in cases of sluggish portal circulation.

The diaphragm being brought forcibly into play, and viscera becoming alternately drawn toward the chest and allowed to descend, these movements tend to induce peristalsis, and especially to favor intestinal elimination, much after the fashion of abdominal massage described above. It should be said, however, that the respiratory exercises are of more value than the local massage in all disorders of digestion that cannot be called strictly local disturbances, and that they will accomplish much more

*Aceording to Dr. Wundt's experiments this negative pressure is ordinarily 7.5 m. m., while during the assistive respiratory exercises it rises to 35 or 40 m.m.

owing to their general effects.

The respiratory exercises are useful in cases of malnutrition, since the tidal volume of air becomes increased and a better oxygenation of the blood ensues. They are also useful when the air-cells need special exercising to overcome those conditions which favor phthisis, etc., and for that reason are indicated in lung diseases, when there is no acute pulmonary congestion.

Respiratory exercises are usually applied at the end of every medico-gymnastic treatment for quite the same reasons as in educational gymnastics; and similarly they may be applied as an introduction to the treatment. Besides they may be given after every two or three other procedures as a special application for the individual case in hand. And it might be said that in all materia gymnastica these exercises head the list for efficacy and general utility.

Before entering upon the description of the special exercises, we would remind the operator that the movements should follow the rhythm of the patients' respiration; that the exhalation should always be very slow, while the inhalation may be somewhat quickened; that the pause in the respiratory act occurs after the exhalation, and that this should be observed in applying the movement; and, finally, that too much repetition, too long duration of respiratory exercises will make the patient dizzy owing to the increased efflux in the head.

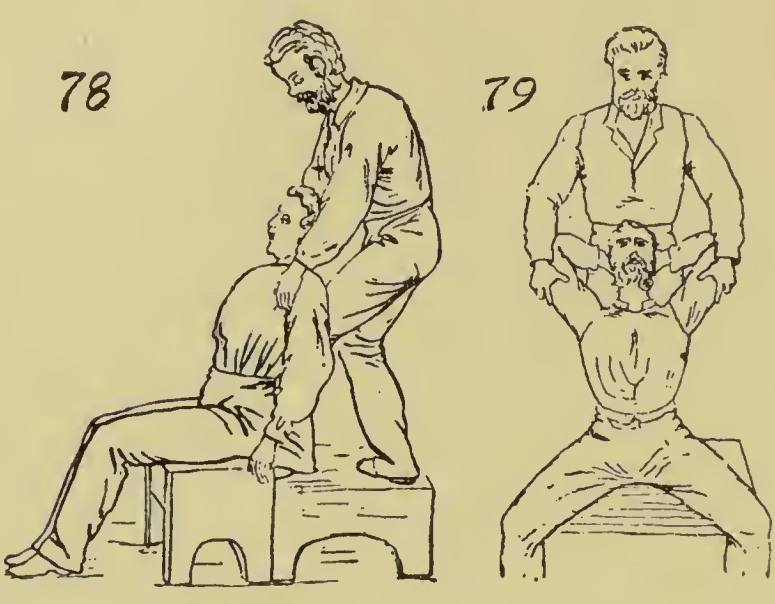
Wg. sitt. 2 should. circ. w. resp. (Fig. 78.) The patient sits on a stool, or a massage bench, etc. The operator stands behind, supports the patient's back with one knee (the contact should be by the external aspect of the leg), and grasps the patient under the axillæ, the hands resting gently against the anterior aspects of the shoulder-joints. The hands should reach under so far as not to allow the finger-tips to press or slide in the axillæ. The operator now tells the patient to breathe in and out in a normal manner; and, falling into the patient's rhythm of respiration, he lifts the shoulders upward backward while arching his thorax over the supporting knee, and lets them sink downward forward while moving the trunk somewhat forward, the lifting taking place during inhalation, the lowering during exhalation, so that the movement becomes an emphasizing of the patient's own effort. Care should be taken not to compress the patient's chest and push his head forward during the exhalation, but to make this merely an easy and natural relaxation. The lifting should be done so as to become communicated throughout the chest; the touch of the hand should be firm but gentle; and the support from the leg should not be a pressing of the knee into the spine.

The movement can also be given so that the operator sits behind and close to the patient supporting the lat-

ter's thorax with his own and grasping the axillæ from behind and underneath, the hands turned edgewise, radial borders up, the fingers resting gently on the chest in front, care being taken not to press the finger-tips into the pectorals. This manner of doing the movement is more agreeable to the patient, who becomes better supported, and to the operator who now works in an easier position. If the patient sits on a high couch, the operator stands behind, and uses this same grasp, the conditions of support and ease of movement becoming the same as when he is sitting behind. The type first described, although the one most commonly used by masseurs in general, is really to be considered as a poor substitute for either of the last two.

The movement produces an increased respiration (with consequent results as described above), especially in the anterior superior portion of the lungs, and so becomes particularly useful in cases of weak pectorals and sunken clavicular region. Whenever a respiratory exercise is needed for its general effects this is the movement usually applied, for it is more comfortable to the patient and is more easily given than any of the others ; besides, it has very few special effects of internal elevation or other changes of visceral inter-relations worth considering. The preference of this movement to str. ly. 2 A.

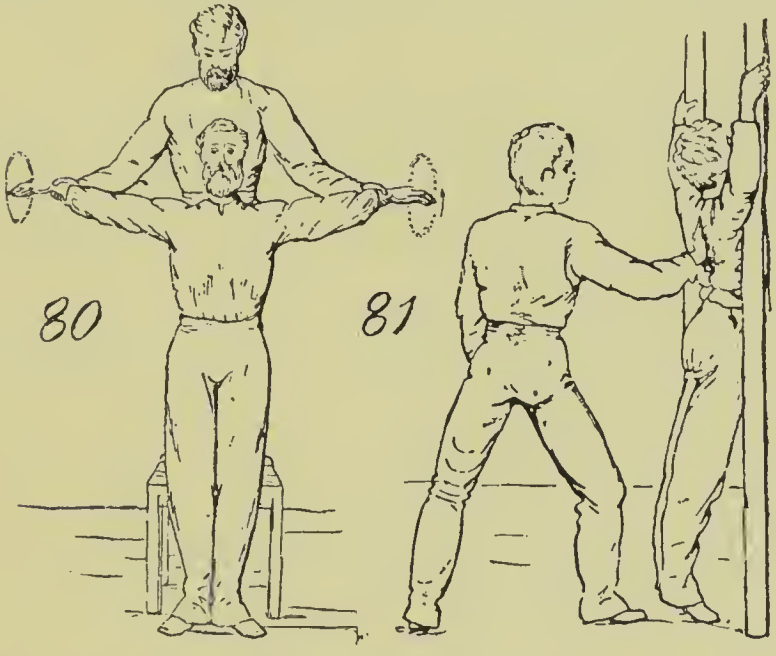
elev. in retroversion, and its contra-indication in anteversion will be discussed in Part II.



Rest sitt. 2 should. circ. w. resp. (Fig. 79.) The operator stands behind the patient and grasps the latter's arms near the shoulders, his forearms resting over the patient's elbows; in other respects the movement resembles the one just described. The expansion of the chest is greater, the tension in the pectorals being stronger, and the base of the lungs is brought more into play owing to the greater motion of the shoulder blade and consequent play of the serratus anticus. In comparison to the preceding exercise there is some diminu-

tion of apicial respiration, the upward-backward motion slightly compressing the clavicular region ; on the other hand the efflux from the head is greater owing to the position of the axillary artery. The movement, besides being used for its own special effects, may be applied as a progression from the preceding one.

Yd. c 2 A. circ. w. resp. (Fig. 80.) The patient stands or sits. The operator stands behind, grasps the patient's



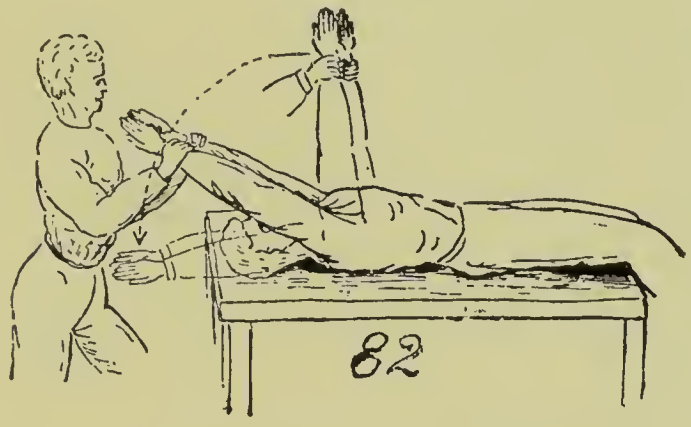
arms near the elbows, lifts them sideways to horizontal and moves them in small circles upward-backward, downward-forward, while the patient inhales and exhales. The movement (which is used comparatively little) pro-

duces an increase of activity in the anterior portion of the lungs ("sternal respiration"), and is used chiefly for patients not quite strong enough for single movements.

Reclin. 2 A. elev. w. resp. The patient is lying down with slightly elevated trunk. The operator stands facing the patient, grasps the latter's arms around the wrists, lifts them forward upward while the patient inhales, and lowers them sideways downward while the patient exhales; he then crosses the patient's hands and presses them gently into the epigastrium so as to exaggerate the exhalation. The patient's arms should be relaxed throughout the movement, and consequently the elbows are always flexed except at the moment when the arms attain str. pos. Take care not to squeeze the patient's wrists.— This movement is used for bed-ridden patients who cannot sit up long enough to take the 2 should. circ.

Reach. ly. 2 A elev. w. resp. (Fig. 82). The patient is in sitt. ly. pos. The operator stands behind, grasps the patient's wrists and lifts his arms to vertical (reach. pos). From that position he draws the patient's arms backward to str. pos., taking care to lift the arms well, so that he, and not the patient, carries them. The arms are brought back to reach. pos. and the movement is repeated, inhalation accompanying the first motion, exhalation the second. As the arms are drawn back a

strong tension occurrs in the chest, which becomes vaulted sagitally and lifted longitudinally ; the abdomen flattens and its contents become drawn toward the chest. So that the movement produces a high degree of internal elevation (= thoracic aspiration plus muscular



pressure) with a tilting backward of viscera. As a respiratory exercise the movement is far more effective than the 2 should. circ. ; and it is especially useful in disorders accompanied by abdominal or pelvic congestion. It is contra-indicated in retroversion, and in lordosis. In the last-named deformity the movement can be used if the legs are first drawn up into 2 cr. *a.* pos. (see fig. 7, page 9), as this will obliterate the effect of tension in the ilio-lumbar fascia. The movement is very useful as a means of lengthening contracted pectorals, and is often applied for this purpose in educational gymnastics to

chest-bound individuals, who are not sufficiently affected by the ordinary exercises of chest-expansion.

The movement can be made resistive; and so become more efficacious as an exercise for internal elevation: the patient resists the drawing back of his arms, the return being passive. The pectorals now being active, the expansion of the chest becomes so much more forcible. It is to be understood that the resistive type is used only for muscularly strong patients, and in special cases, and that it is not applied as commonly as 2 should. circ. and others of this group.

Str. gr. st. chest expansion. (Fig. 71, page 104.) The patient stands with his back to the stall-bars, arms extended upward and grasping the highest bar within reach. The movement is executed like the str. gr. st. T. vibr. (page 103), the patient inhaling as he is being pulled forward, and exhaling as he returns to commencing position. The movement can be done as well at the hor. bar., in a doorway, between two vertical poles (fig. 87), etc., etc. — The movement is especially useful in disorders of the respiratory organs, although it may also be used for its general effects.

Str. sitt. 2 A. flex. w. resp. The commencing position of patient and operator is as for str. sitt. 2 A. circ. (Fig. 47, page 54.) The patient draws his arms down to bend pos. (fig. 40. 2) while the operator offers a moderate

resistance, the return to str. pos. being passive on the part of the patient. During the flexion the operator should guide the patient's arms so that the elbows do not come forward. The patient inhales while he flexes his arms, exhales while the operator extends them. The exercise emphasizes apical respiration and widens the chest transversely, and so is especially useful for patients of phthisical habitus. The movement may also be given from reclining and lying pos. and will then produce more effect on viscera, the tension in the anterior muscles reaching the farther down the more the hip-joint straightens.

Wg. st. Heel elev. w. chest exp. The patient stands with his hands on his hips (fig. 24). The operator stands behind and grasps the patient's arms (the hands resting on the anterior aspect), tells him to rise on tip-toe and inhale, and meanwhile presses the arms gently backward (the pressure is tentative and vibratory), taking care not to press the elbows up or down, but straight backward. The patient is told to lower his heels and exhale and meanwhile the operator removes the pressure. The movement is used chiefly as a corrective exercise for flat-chested, chest-bound, and round-shouldered children — as an exercise for muscular extension rather than one for respiratory effects.

St. 2 A. elev. sidew. w. chest perc. The patient lifts his

arms sideways to horizontal while inhaling, and meanwhile the operator applies a gentle chest percussion as previously described (see page 83). By adding the percussion to the respiratory act, the air becomes driven into air-cells which may otherwise remain inactive; and hardened, inelastic cell walls may become distended and restored to normal condition. Besides the percussion favors absorption of mucus in the bronchioles and so helps to remove impediments to the free passage of the air. The movement is used in bronchitis, incipient consumption, etc., i. e., whenever the respiratory exercise is especially intended to affect the lung tissue itself. As a respiratory exercise for general effects it would be ~~prac~~ practically valueless.

Resistive movements. In addition to what has already been said about resistive movements it should be mentioned that the resistance should always be applied at right angles to its lever (so that the lever of the weight does not change during the movement), as this gives a steadier movement, one more comfortable to the patient. The only change in the resistance should be one of pressure (weight), which is made to increase as the lever of the power grows (toward the middle of the movement) and to decrease as the lever shortens (at the beginning and end of the movt.). The resistance throughout should be so moderated as to give a movement of uni-

form velocity — slow rather than quick — and motions done in pushes and starts, or with so much resistance as to cause vibration should be discouraged, as neither is in accordance with the laws of normal muscular contraction and produce undesirable effects on muscle-fibre and motor nerve, they usually being types of overwork. Moderate the resistance carefully according to the patient's strength, and remember that medical gymnastics is not combative exercise (wrestling), but that even a slight resistance is enough to increase the muscular activity with consequent effects over that of ordinary everyday life or of single movements. The purpose is to get some exaggeration in the effect of the active movement, not to find how "strong" the patient is. In scoliosis and similar disorders, on the other hand, the resistance is often driven to the patient's utmost power (= his nervous capacity inside the limits of normal fatigue), since it is then a question of getting the utmost pressure for displacement of bone, cartilage, etc.

When taking hold of the patient, do not pinch or squeeze; and while one hand gives the resistance, steady the next articulation with the other hand, so as to get the greatest fixation of muscular origin and so gain the best isolation of movement and localization of effect. It is to be understood that isolation has also been provided by a correct choice of position and direction of motion:

the axis of motion should be at right angles to the median of that muscle which is to be the most active. A total isolation is impossible; but those synergists contribute the least to the movement whose medians deviate the most from the 90° angle.

Flexions and Extensions: —

Sitt. neck ext. The patient sits with his hands on his knees and his head bent forward. The operator stands behind, places one hand on the patient's shoulder, the other against his occiput, and with this hand he offers resistance against the patient's effort of flexing the neck backward. The patient again bends his head forward (without resistance) and the movement is repeated three or more times. If the movement is given for circulatory effects, the head should bend backward with upturned face (to stretch the cervical fascia); if for muscular effects, correction of posture, etc., the chin should be drawn in (so as to lift the sternum). The movement is used to increase the afflux to the head; to increase the nutrition of the brain; to relieve that cervico-dorsal fatigue which results from prolonged work in a stooping posture; to correct the posture of chest, head and dorsal spine in flat-chested, stoop-shouldered individuals; and to exercise the trapezius, complexus, levator scapulæ, etc., in cases of rheumatism, torticollis, and cervical neuralgia, etc. In such cases, for unilateral muscular action, the

head is rotated more or less before bending, in order to bring about the proper condition of isolation (details which belong in kinetic anatomy, and are supposed to be familiar to the skilled masseur).

83

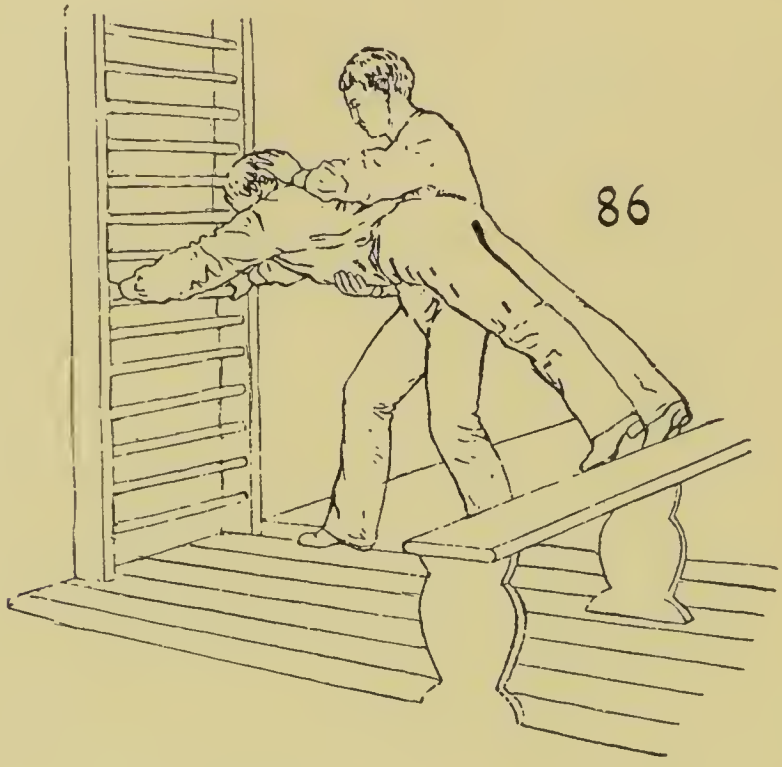
85

84

The movement may also be done from st. pos. (fig. 83), reach gr. st. (compare fig. 68, page 88), stoop fall. (fig. 86), wg. forw. ly. (compare fig. 6, pp. 8), and balance hang. (fig. 87 and 88), the mechanics of which hardly need description.

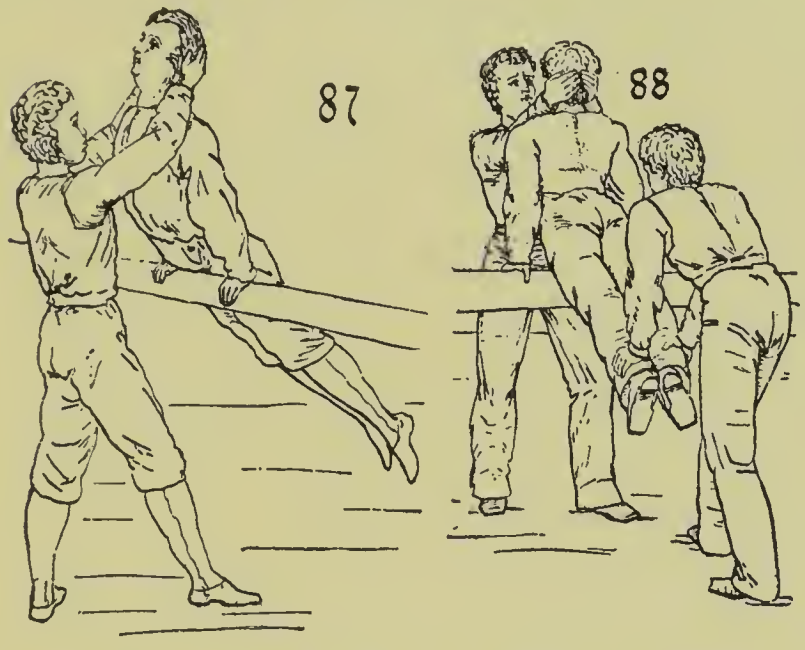
The st. pos. lessens the motor neurition to the neck, part of the volition being spent in retaining the equili-

brium, and consequently the degree of exertion becomes greater than in sitt. pos. Also the hip-joint being straight, and the lumbar spine being somewhat arched



forward, the ilio-lumbar fascia is relaxed, and so the inferior muscular origin does not have the same degree of fixation nor of distance from the insertion as in sitt. pos., which circumstance contributes to making the necessary muscular effort greater.

The positions with inclined trunk (forw. ly., stoopfall, etc.) make the deep neck muscles perform the extension, the trapezius being occupied in retaining the position,



consequently they are used as means of changing the localization of effect. Besides they are used for purposes of emphasizing the correction of a stooping posture, the effort extending farther down the back than in sitt. pos.

Sitt. neck sidew. ext. The patient is sitting with his hands on his knees. The operator stands behind, and placing his left hand on the patient's left shoulder, the right against the right side of the latter's head (just

above the ear), he pushes the head gently and (passively) to the left as far as it will go. The patient now straightens his neck and bends it as far to the right as muscular tension will permit, the operator offering a moderate resistance and holding down the patient's left shoulder with the corresponding hand. The operator then changes grasp, letting his right hand drop to the patient's right shoulder, and placing his left against the left side of the patient's head, and the movement takes place to the opposite side. It is repeated three or more times, alternately to each side, the operator changing grasp each time. The movement brings into play the scaleni, and may be used as a means of lifting the first two ribs in order to secure better inspiratory power. It is also used in muscular rheumatism of the neck, in cervico-brachial neuralgia, in torticollis (then only to one side), and as a means of increasing the afflux to the brain.

By slightly rotating the head before flexing, a change of muscular isolation may be affected, so that one scalenus becomes more active than the others, etc.

Reclin. F. flex. and ext. (Fig. 89 and 90.) The patient reclines, the operator sits to one side with the patient's leg across his lap, the heel fully outside his thigh. With one hand (the proximal one=left for right side, right for left) he grasps the leg near the ankle, and with the

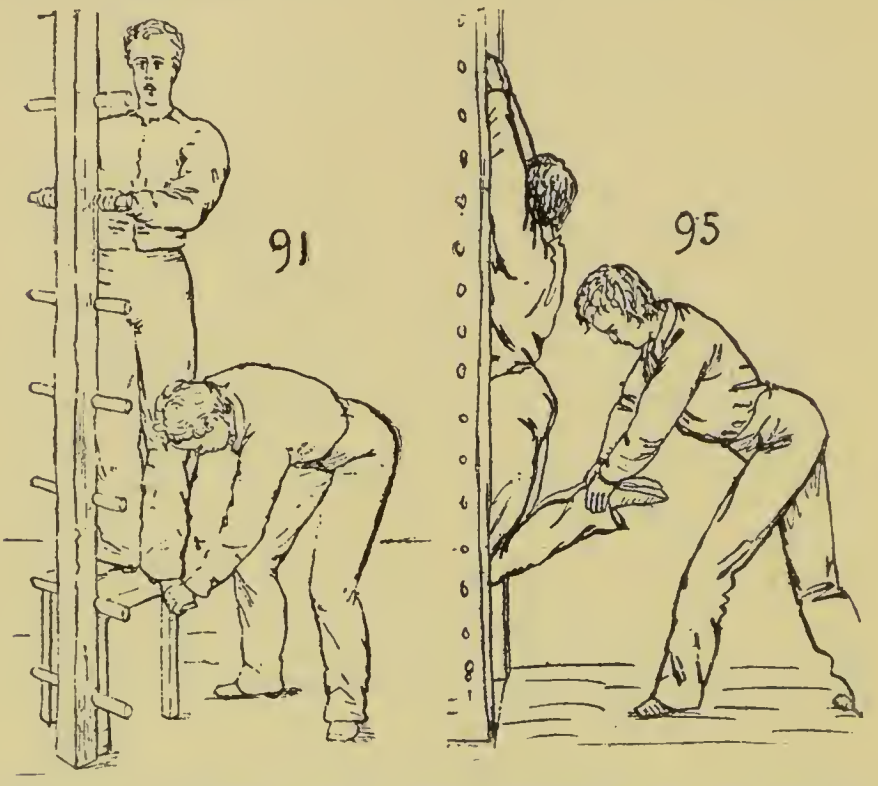
other he resists the flexion and extension of the ankle, the heel of his hand pressing against the ball of the foot during extension (fig. 89.), the palm against the upper surface of the metatarso-phalangeal articulations during flexion (fig. 90). The movement is repeated a

number of times, the grasp of the resisting hand changing as the movement changes, and it is usually ended by passive foot flexion (=pressing the foot up as far as the resistance in the hamstrings will permit).

The movement is used to increase the afflux to the leg, and to exercise weakened muscles in rheumatism, paresis, traumatism, etc. It is to be understood that resistance is made only to flexion in case of weak flexors, and only to extension when the extensors are to be exercised.

High 1-2 *st. F.flex.and ext.* (Fig.91.) The patient stands on a chair, his hands supported against a wall or bar,

etc., and one foot resting over the edge of the chair (the heel on the chair, the toes hanging over). The operator grasps this foot with one hand behind the



heel for support, the other resisting on the dorsal and plantar aspects, as the patient flexes and extends his ankle. The activity of the position is greater than in the preceding movement, so that the degree of motor effort is greater. Also, the straightening of the hip-joint insures a greater afflux and a less muscular isolation, the effort extending into the glutei and psoas-iliacus.

The movement is used as a progression from the preceding ones, and as a unilateral exercise in scoliosis, infantile paralysis, etc.

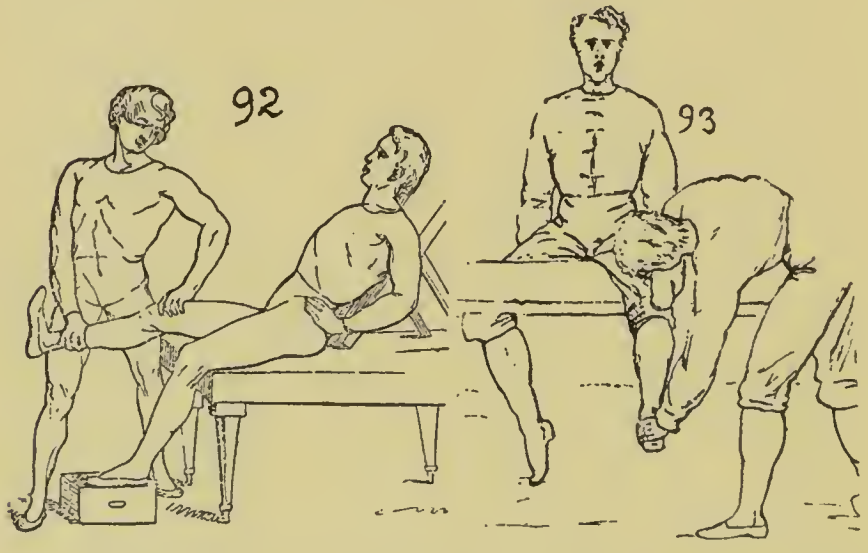
Hang. F. flex. and ext. The patient hangs from a bar or other apparatus, the operator stands behind and resists the flexion and extension of the ankles, with one hand for each foot. The movement may be done symmetrically or unilaterally, in the former case as a means of emphasizing the stretching of the spine by adding weight, in the latter case to depress a high hip (scoliosis), or to cause local increase of nutrition in an atrophied leg, etc.

In its effects on the circulation the movement is stronger than the preceding two, but in point of muscular localization it is not as strong.

Passive F. flex. The patient reclines with his leg across the operator's lap. The operator grasps as for res. F. flex. ext. (fig. 90), and presses the patient's foot upward as far as muscular resistance will permit. The movement is usually combined with vibration. It is used as a means of stretching shortened hamstrings; to increase the mobility of the ankle; and to secure better efflux in the leg (by expansion of posterior capillaries).

Reclin. Kn. flex. and ext. (Fig. 92.) The patient reclines, the operator sits to one side with the patient's nearer thigh resting over his own. His proximal hand

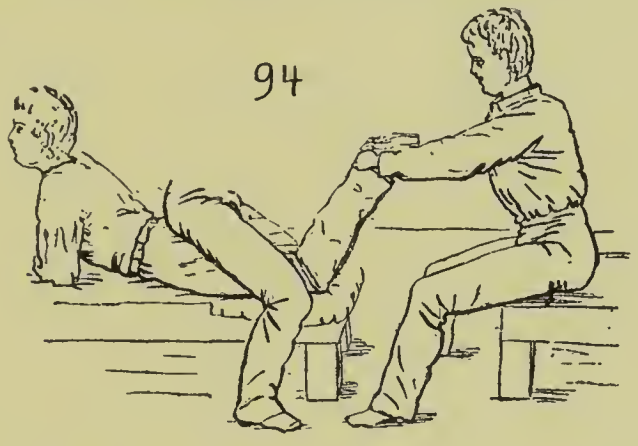
rests over the patient's thigh just above the knee (so as to prevent the thigh from rising during the flexion); and, grasping the leg just above the ankle with his distal hand, alternately over and under, he resists the extension and flexion of the knee. Remember never to make the extension excentric, *i. e.*, not to press the leg down under resistance from the patient, as this has repeatedly caused synovitis by distension of the capsule (due to excessive contraction of the subcrureus).



The movement is used for local exercise of the thigh-muscles, and as a powerful means of increasing the afflux (the nutritive activity) in the leg as a whole. It is very suitable in disorders of digestion due to abdominal or pelvic congestion.

1-2 *Sitt. Kn. flex. and ext.* (Fig. 93.) The patient stands with one thigh supported over a bar (or other apparatus, compare fig. 14). The operator stands to one side and uses the same grasp as for the movement just described, the execution also being the same.

The movement is stronger than the preceding one both as regards muscular effort and circulatory effect, and it is used as a progression from that one.



Prone ly. Kn. flex. and ext. (Fig. 94.) The patient lies face down on a couch. The operator sits behind, grasps the patient's legs just above the heels and resists the flexion of the knees, then moves his hands to the anterior aspect of the legs and resists the extension. (The flexion is driven passively to the involuntary limit after the voluntary limit has been reached.) The patient's thighs may be held down (for better localization) by an

assistant (as shown in the cut) or by a strap.

The flexion is used to exercise the hamstrings and is then often given unilaterally and from 90 ° with rotation inward or outward, according to which hamstring is to be the most active. The double movement (flex. and ext.) is used to increase the afflux to the leg for the purpose of diminishing spinal congestion, the position favoring the return current from the spine.

Hang 2 Kn. flex. and ext. (Fig. 95.) The patient hangs from the stall-bars, facing them. The operator stands behind; grasp and movement as just described. The cut shows the excentric flexion, the hands being turned out (in prone ly. 2 kn. flex. they are turned in), and the operator pressing the legs down under resistance from the patient. This is the most common form of the movement in that position. Not only the hamstrings, but also the glutei and erector spinæ, etc., are now brought into play, and the movement becomes a means of strengthening a weak sacro-dorsal region for better equilibrium in standing and walking. [It should be remembered that, while the glutei do not determine the equilibrium of st. pos., they are the chief muscles for the pendulum motion of the legs in walking, and their atrophy or paralyzation means a loss of the power and coordination of this movemont, if not its total disappearance. On the other hand, the erector spinæ determines

the equilibrium of the trunk in st. pos., and this movement furnishes an excellent means of exercising and strengthening its most inferior portion *in its relation* (synergy) *to movements of the leg*].

The movement has given good results in polyomyelitis; in akinesia after fevers; in educational gymnastics for the correction of posture, etc., etc.

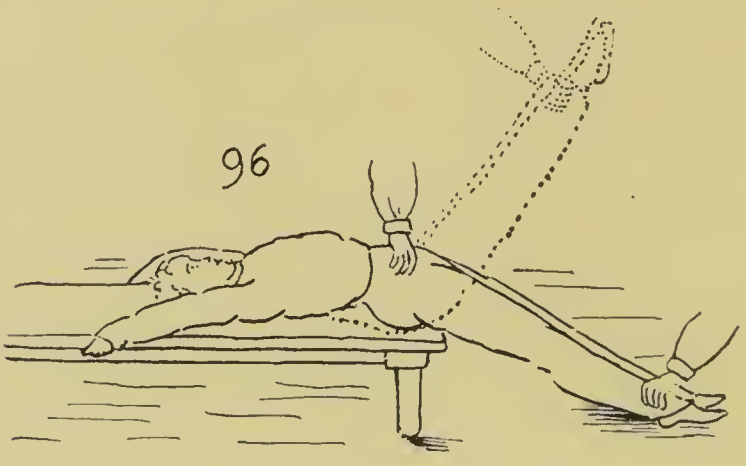
[Before entering upon the details of hip-flex. etc., we take occasion to remind the operator a little of the action of the abdominal muscles.

These muscles may be classed into two groups—one vertical, one horizontal. The first embraces the ext. oblique, quadr. lumborum, rectus abdom., psoas, and iliacus; the last includes the transversalis, and the int. oblique. The horizontal group is active in transverse movements; the vertical group in sagittal movements. Synergists to the former are the internal intercostals; to the latter, the ext. intercostals, the serratus anticus, and the pectorals.

The muscles surround the abdominal cavity by two spiral layers nearly at right angles to each other and one transverse layer (compare the heart), their simultaneous contraction causing a diminution of the cavity in its three dimensions.

Owing to the lineæ transversæ, the rectus contracts vermicularly: and, depending on which end is the origin (the fixed point) at the time, the muscles may contract from above downward, or from below upward, causing a corresponding compression of viscera. They may contract from bony insertion, or from tendinous insertion (ilio-lumbar fascia, lineæ transversæ, alba, and semicircularis, and Poupart's lig.), or with viscera as the fixed point. Finally they may contract from behind forward, or from before backward. They are brought into play in hip flex. proportionately as the moment of weight grows.]

Str. gr. ly. 2 *L. flex.*—The patient is lying face up on a bench or couch grasping its sides, his arms being extended upward. The operator stands facing the patient, grasps his legs just above the heels, and offers a moderate resistance while the patient draws his feet up (flexing at hips and knees). The heels should be kept together, and the knees spread apart as they flex. When the voluntary limit is reached, the operator presses the patient's knees as far up as gluteal resistance will



permit, and brings the legs passively back into commencing position. The movement is repeated from three to nine times. The psoas-iliaci and external obliques are brought into play, compressing the abdominal cavity from below upward, and driving its contents toward the highly expanded chest. The movement relieves pelvic hyperæmia and causes a lifting of viscera. Being an active

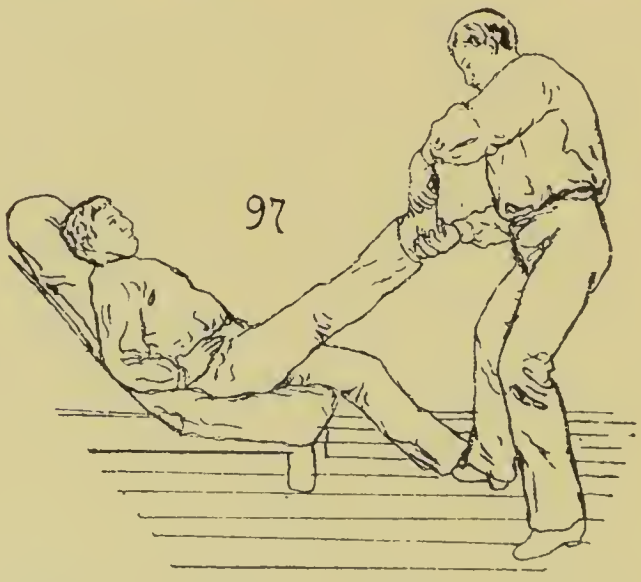
movement—a movement of nutrition—it becomes exceptionally useful in those pelvic disorders, where a general visceral depression has resulted from prolonged congestion with consequent malnutrition of supporting bands, ligaments, and muscles. It is also useful in cases of pelvic fatigue (without uterine complications) resulting from prolonged standing position (clerks, salesmen, artisans, etc.) It is contra-indicated in retroversion.

Str. gr. ly. 2 Hip flex.— (Fig.96). The patient is lying down as in the preceding movement. The operator stands at his side, places one hand on his abdomen, the other on his ankles and offers a slight resistance while the patient slowly lifts his legs to nearly vertical. The hand which rests on the abdomen gives a gentle pressure inward upward. Still pressing on the abdomen, the operator pushes the patient's legs down, while the patient offers a slight resistance; and the movement is repeated two or more times. The patient must not hold his breath while doing the movement. The movement is usually applied with resistance only going up, or only coming down, the return to commencing position being passive.

The concentric movement (the going up) produces a compression of viscera from below, backward upward; has effects similiar to the preceding movement; and is used for the same purposes, but is much stronger.

The excentric movement (the pushing down) produces a downward pressure on the contents of the intestines (thanks to the expansion of the chest, viscera are not depressed), and so becomes useful in obstinate cases of constipation, intestinal indigestion, etc. Both movements are excellent to reduce adipose tissue.

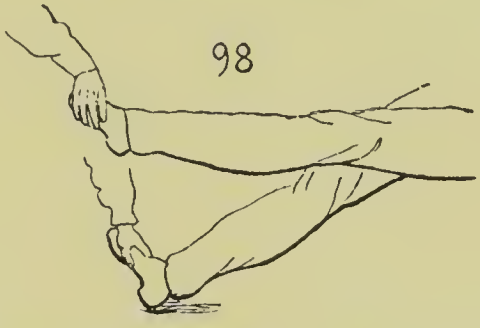
For weak patients it is safest to do the concentric movement at first without resistance at all, the length of the



lever making the moment of weight very great without the added pressure. With very weak individuals it may even be necessary to begin by lifting one leg at a time.

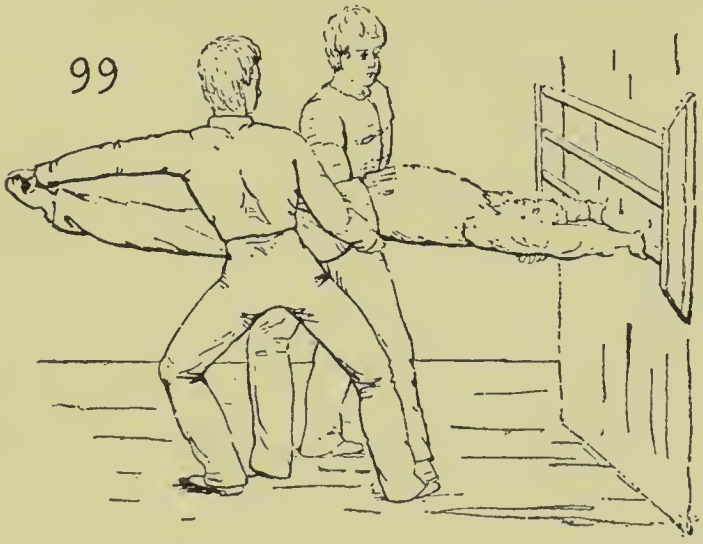
Similar movements are cr. *b.* reclin. exc. hip flex. (fig. 97), and fallhang. exc. hip flex. (fig. 98). Both are milder than the one just described, and produce a down-

ward pressure on the posterior aspect of viscera, the psoas-iliacus being more active than the external obliques



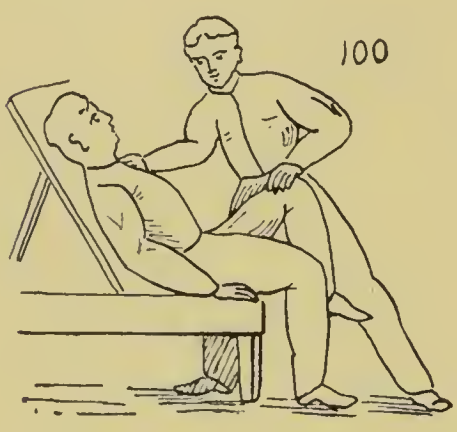
(owing to the difference of com. pos.). The extreme of this movement is shown in fig. 99.

Cr. a *reclin. hip flex.*—(Fig. 100). The patient is



reclining with feet on the floor. The operator stands at the side, places one hand against the patient's shoulder,

the other on his knee, and resists while the patient lifts that knee. Having reached the voluntary limit of motion, the operator pushes the movement to the passive limit, and then presses the patient's knee down while the latter resists. The movement is repeated three or more times.

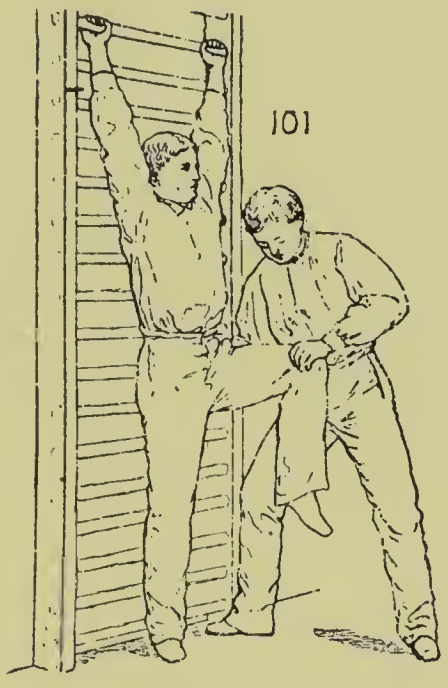


The effects are similar to those of ly. 2 Hip flex., only far milder, and confined more to the inferior one-half of the abdomen (the chest being relaxed). If the movement is applied in pelvic disease, it is best to resist only the upward movement, or at least to place the arms in rest, or str. gr. pos. (so as to prevent internal depression).

If the movement is given to cause a pressure on the colon, the concentric movement (resist the coming up) is applied on the right side, the excentric (push down) on the left, so as to conform to the motion of the con-

tents of the colon—ascending on the right, descending on the left.

The movement may also be done from str. gr. st. pos. (fig. 101), and from Cr. *a* hang, which both are consider-



ably stronger. There is also 2 Cr. *a* hg. exc. 2 Hip flex. (fig. 102), which is the strongest of this group. The extreme of the movement is shown in fig. 103.

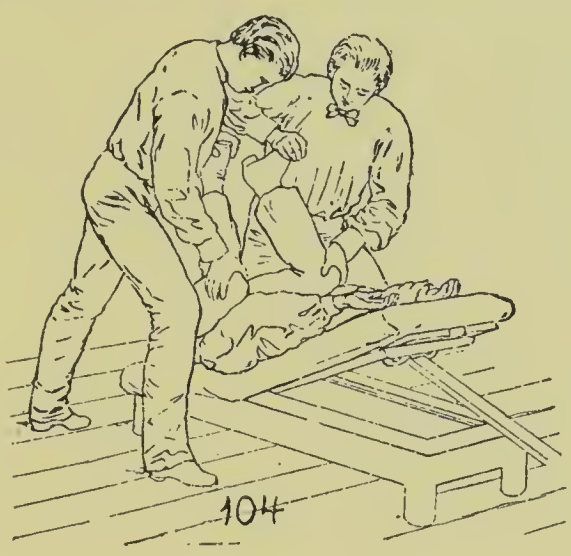
Reclin.passive hip flex.—Standing at the side, the operator grasps the patient's leg with one hand just above the popliteal space, the other just above the heel, and presses the leg as far up as muscular resistance will per-

mit. If the tension is to be localized to the glutei, the knee should be flexed (fig. 104); if to the hamstrings, it should be extended.

103

The movement is used as a means of stretching the sciatic nerve (in sciatica), and of producing vascular expansion in the leg (to relieve a back-ache, pelvic congestion, etc., etc.).

Cr. a *reclin L. ext.* (Fig. 105). The operator stands in fallout pos. at the patient's side, half facing him; holds the patient's leg in cr. *a* pos., his proximal hand grasping the heel from outward, the leg resting over his fore-



arm, and the distal hand grasping over the instep. Gradually removing his weight into the distal leg (which bends, the other one stretching), he offers a moderate resistance to the patient's effort of stretching his leg. The movement is repeated six or more times, the return to com. pos. being passive.

This exercise secures strong afflux to the leg with a minimum of expenditure of energy. It can be given to even the weakest patients (even those with organic

heart-disease), and is commonly used as a finish to cr. *a* reclin. hip circ., described in preceding pages. Besides causing a powerful acceleration of the pelvic circulation without increasing the muscular activity of that region, the movement also exercises those muscles which secure stability of base in the upright posture. The ease of position, the gentleness of effort in execution, and the extent of its effects, make the movement appear frequently in medico-gymnastic prescriptions.